The London Resort Development Consent Order

BC080001

Environmental Statement
Volume 2: Appendices

Appendix 13.8 – Marine Conservation Zone Assessment

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December 2020

Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009
Regulation 5(2)(a)
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
Regulation 12(1)

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Revisions

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Executive Summary

Marine Conservation Zones (MCZs) protect a range of nationally important marine wildlife, habitats, geology and geomorphology in English and Welsh territorial and UK offshore waters. Marine works at the Kent Project Site of the London Resort Proposed Development will be within the Swanscombe MCZ. The Swanscombe MCZ is designated for intertidal mud and tentacled lagoon worm features.

Specific consideration of MCZs is required for any marine licence or Development Consent Order (DCO) applications in English or UK waters. Under section 126 of the Marine and Coastal Access Act (2009) (MCAA), public authorities (i.e. the Marine Management Organisation (MMO) for marine licence applications or the Secretary of State (SoS) for DCO applications) have specific duties for MCZs in relation to certain decisions. 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; or
    - (ii) Any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.

This document is informed by guidance published by the MMO (MMO 2013) on how these assessments should be undertaken and by advice from the Statutory Nature Conservation Bodies (SNCBs) during consultation in the pre-application phase.

This report presents an assessment of the potential ecological impacts of the Proposed Development and related marine operations on the Swanscombe MCZ. This MCZ assessment was prepared as ES Appendix 13.8 to the Environmental Statement (ES).

The protected features of the Swanscombe MCZ are intertidal mud and the tentacled lagoon worm *Alkmaria romijni*.

Three options are currently being considered for the design of the marine infrastructure elements of the Proposed Development at the Kent Project Site (Options A-C) and of these only Option C involves dredging:

Option A

- New ferry terminal and ferry pontoon with linkspan.
- Refurbishment of Bell Wharf – an open-piled quay deck
- Construction of a new floating Roll on-Roll off (Ro-Ro) platform and linkspan (Option A only)

Option B

- New ferry terminal and ferry pontoon with linkspan
- Refurbishment of Bell Wharf – an open-piled quay deck
- Refurbishment/reinforcement of White's Jetty – an open-piled deck structure in an uncertain state of repair (Option B only)

Option C

- New ferry terminal and ferry pontoon with linkspan
- Refurbishment of Bell Wharf – an open-piled quay deck
- Dredging to deepen access to Bell Wharf (Option C only)

Firstly, Screening was conducted to determine whether Section 126 of the Marine and Coastal Access Act (MCAA) (2009) should apply to the application based on consideration of the bullet points indicated in (b) above.

It was determined that the features or ecological/geomorphological processes supporting these features could potentially be affected significantly by the activities associated with the Proposed Development. Consequently, a Stage 1 assessment was conducted for each of the different options.

The Stage 1 assessment of the MCZ considered whether the condition in Section 126(6) of the MCAA could be met (i.e. whether there was a significant risk of the Proposed Development hindering the achievement of the MCZ conservation objectives). For the MCZ feature intertidal mud, it was assessed that there was no significant risk under options A, B or C of the potential effects of the Proposed Development hindering the achievement of the conservation objectives stated for the Swanscombe MCZ. An initial draft of this MCZ assessment was reviewed by Natural England (NE) with comments provided on 10th December 2020 and NE supported this assessment for intertidal mud.

For the MCZ feature tentacled lagoon worm, recent advice from NE on the draft MCZ assessment (received 10/12/2020; Ref: DAS 6848) agreed that the potential effects of Options A and B would be greatly reduced compare to Option C (mainly due to the requirement for dredging for Option C only) and with these Option A and B there would be lower risk of hindering the achievement of the conservation objectives stated for the MCZ, although NE has indicated Stage 2 assessment will still likely be required with Options A or B. Discussion is being held with NE to determine options to minimise potential effects of the Proposed Development on tentacled lagoon worm if either Option A or Option B is taken forward.

Under Option C, it was considered that there is a potential significant risk that achievement of conservation objectives could potentially be hindered for tentacled lagoon worm. This is also the view of NE based on comments on the draft MCZ assessment. With this being the case, under section 126(7)(a) of the MCAA it is necessary that the developer satisfies the authority that 'there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of those objectives'. Therefore, Option C will only be taken forward if Options A and B are found not to be feasible which is not currently anticipated to be the case. If Option C was to be pursed, a Stage 2 assessment would be required for tentacled lagoon worm.

In combination effects with other projects were also considered. Five projects were considered (Tilbury2 port terminal; Thurrock Flexible Generation Plant; The Pier, by Crest Nicholson; Purfleet Centre Regeneration; and the Tilbury Energy Centre). It was concluded that no in combination impacts were expected that would change the outcome of the assessment.

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Glossary

AoO	Advice on Operations
CMAT	Construction Materials and Aggregates Terminal
DCO	Development Consent Order
DO	Dissolved Oxygen
EIA	Environmental Impact Assessment
ES	Environmental Statement
IFCAs	Inshore Fisheries and Conservation Authorities
JNCC	Joint Nature Conservation Committee
MarESA	Marine Evidence-Based Sensitivity Assessment
MarLIN	Marine Life Information Network
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MEEB	Measures of Equivalent Environmental Benefit
MMO	Marine Management Organisation
MPA	Marine Protected Area
MW	Megawatts
NE	Natural England
PEIR	Preliminary Environmental Impact Assessment
PINS	Planning Inspectorate
RoRo	Roll-On Roll-Off
SNCBs	Statutory Nature Conservation Bodies
SPA	Special Protection Area
TOC	Total Organic Carbon

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Chapter One ◆ Introduction

BACKGROUND

1.1 The London Resort Proposed Development is split across the north and south bank of the River Thames. For clarity, the section of the Project Site that is to the south of the Thames is referred to in this report as the 'Kent Project Site' and that to the north of the river is identified as the 'Essex Project Site' (see ES Figure 13.1: Order Limits; figure reference 6.3.13.1).

1.2 As part of the proposed works, infrastructure will be constructed within the tidal Thames at the Kent and Essex Project Sites.

1.3 A section of the Kent Project Site is located within the Swanscombe Marine Conservation Zone (MCZ), which is designated for the features 'intertidal mud' and the 'tentacled lagoon worm *Alkmaria romijni*' and covers an area of approximately 3 km^2 (Figure 13.8.1). Consequently, this Marine Conservation Zone (MCZ) assessment has been conducted to accompany the overall Environmental Impact Assessment (EIA) for the Proposed Development.

OBJECTIVES OF THE MCZ ASSESSMENT

1.4 The objective of this report is first to provide information required to enable the Secretary of State (SoS) and other public authorities and the Statutory Nature Conservation Bodies (SNCBs) to conduct the Screening to consider whether the Development is capable of affecting (other than insignificantly):

- the protected features of the Swanscombe Marine Conservation Zone (MCZ); or
- any ecological or geomorphological process on which the conservation of any protected features of the Swanscombe MCZ is (wholly or part) dependent.

1.5 The Stage 1 assessment then considers whether:

- there is a significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ.

1.6 This report provides information about the features of the Swanscombe MCZ and the approach to assessment. An impact assessment is then conducted to assess the potential effects of the Proposed Development on the features of the MCZ.

1.7 NE provided comments on a draft of this MCZ assessment which was submitted for review. Comments were received on 10/12/2020 (Ref: DAS 6848) and have been considered/addressed within this current draft.

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Chapter Two ◆ Proposed Development Design

2.1 Full details of the proposed design are provided in Environmental Statement (ES) Chapter 3 'Project Description'. In summary there are three main options as follows, Option A (Figure 13.8.2), Option B (Figure 13.8.3) and Option C (Figure 13.8.4) all of which are within Swanscombe MCZ.

2.2 The ferry terminal which is located within the MCZ, is proposed to be on piles. As the number of piles has not yet been finalised and due to considerations of shading, the area of habitat under the terminal has been considered to be equivalent to a loss of habitat for the purposes of this assessment (i.e. the full footprint has been estimated), although actual loss of habitat (i.e. within the footprint of individual piles) would be a lot less. This is considered to be a precautionary worst-case scenario for the assessment.

2.3 As part of the project, new saltmarsh will be created within the Kent Project Site by breaching the existing sea defences and via interventions at the shoreline. This will increase areas of mud flat, salt marsh, small pools, rocks and shingle areas, with reeds, sedges and grasses transitioning into scrub vegetation. It is estimated that c.3 ha of saltmarsh habitat will be created. Further details are provided in ES Appendix 12.3: *Ecological Mitigation and Management Framework*, document ref: 6.2.12.3.

KENT PROJECT SITE

2.4 Aspects of the Proposed Development are as follows:

Option A

- New ferry terminal and ferry pontoon with linkspan
- Refurbishment of Bell Wharf – an open-piled quay deck
- Construction of a new floating Roll on-Roll off (Ro-Ro) platform and linkspan (Option A only)

Option B

- New ferry terminal and ferry pontoon with linkspan
- Refurbishment of Bell Wharf – an open-piled quay deck
- Refurbishment/reinforcement of White's Jetty – an open-piled deck structure in an uncertain state of repair (Option B only)

Option C

- New ferry terminal and ferry pontoon with linkspan
- Refurbishment of Bell Wharf – an open-piled quay deck
- Dredging to deepen access to Bell Wharf (Option C only)

ESSEX PROJECT SITE

2.5 The proposed works at the Essex Project Site will involve construction of a new ferry pontoon with linkspan (Figure 13.8.5). No dredging is required at the Essex Project Site and the proposed works are approximately 4 km downstream of the boundary of the Swanscombe MCZ. As the MCZ features are primarily affected by direct impacts such as removal and direct disturbance and the works at the Essex Project site will involve piling activity and a discharge at a surface water outfall (see Paragraph 6.1) it is unlikely any direct or indirect effects from activities at the Essex Project Site will impact the MCZ and as such they are not considered further in this assessment. As such it is considered that activities at the Essex site are not capable of affecting (other than insignificantly) (i) the protected features of the MCZ; (ii) any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependent.

Chapter Three ◆ Legislative Context

BACKGROUND AND LEGISLATIVE CONTEXT FOR MARINE CONSERVATION ZONE ASSESSMENT

3.1 The SNCBs (Natural England (NE) and Joint Nature Conservation Committee (JNCC)) have a statutory and advisory role in the identification and delivery of MCZs under Section 127 of the Marine and Coastal Access Act 2009 (MCAA). SNCBs also have a wider role in relation to identification and monitoring of MCZs and reporting on MCZs and the Marine Protected Area (MPA) network (NE 2014).

3.2 A range of public authorities have responsibility for regulation of activities occurring in the sea and on the coast. These include the Marine Management Organisation (MMO), the Inshore Fisheries and Conservation Authorities (IFCAs), the Environment Agency, Local Authorities, Harbour Authorities and the Department of Energy and Climate Change (Defra 2013).

3.3 Once designated, the Marine Management Organisation (MMO) and the Inshore Fisheries and Conservation Authorities (IFCAs) are responsible for the management of MCZs. The scope of duty for the IFCAs will depend on the conservation objectives set for a particular MCZ (Defra 2010).

3.4 Where the functions of a public authority have the potential to impact on an MCZ the Marine and Coastal Access Act (2009) (MCAA) created an obligation on the authority to carry out its functions in a manner that best furthers the conservation objectives of the MCZ (Section 125 of the MCAA). Where this is not possible, the public authority is required to proceed in the manner that least hinders the achievement of the MCZ's conservation objectives (Defra 2013).

3.5 Regulators set conditions on a licence/order/permit that are proportionate to the scale and nature of the impact and would identify any mitigation measures required. They would also have regard to the advice of the SNCBs and, since the advice from the SNCB may differ for MCZs containing features with a conservation objective of 'recover', it is possible that conditions on a licence may also differ in these cases (JNCC 2011). For MCZs with conservation objectives of 'maintain', any licence conditions, including mitigation requirements are likely to be similar to those in the same circumstances outside a designated site (JNCC 2011).

3.6 Specific consideration of MCZs is required for any marine licence or DCO application in English or UK waters. Under section 126 of the MCAA, public authorities (i.e. the Marine Management Organisation (MMO) for marine licence applications or the SoS for DCO applications) have specific duties for MCZs in relation to certain decisions. Section 126 applies where:

- 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; or
    - (ii) Any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.

3.7 Consequently, an MCZ assessment was conducted for the Proposed Development in line with the guidance 'Marine conservation zones and marine licensing' (MMO 2013) and advice from the Statutory Nature Conservation Bodies (SNCBs) during consultation in the pre-application phase.

Chapter Four ◆ Swanscombe MCZ

4.1 The Swanscombe MCZ was designated on 31st May 2019, to protect specific features in the area. These protected features are intertidal mud and the tentacled lagoon worm *Alkmaria romijni.*

4.2 The Swanscombe MCZ NE advice package indicates that the conservation objective and general management approach for both intertidal mud and the tentacled lagoon worm features is to 'Maintain in favourable condition' where favourable condition is defined as the following (Defra 2013):

- Its extent is stable or increasing; and
- Its structure and functions, its quality, and the composition of its characteristic biological communities are such as to ensure that it remains in a condition which is healthy and not deteriorating.

4.3 The location of the feature intertidal mud within the Swanscombe MCZ is indicated in Figure 13.8.6 along with target sample locations for a tentacled lagoon worm survey conducted on behalf of NE and Defra in 2017. The locations at which tentacled lagoon worm was recorded during the 2017 survey are indicated Figure 13.8.7 (Defra 2019).

4.4 Project-specific surveys have also been conducted in the intertidal and subtidal zone in 2015 (see ES Appendix 13.2: *Marine Ecology and Biodiversity Baseline Conditions*, document ref: 6.2.13.2 for summary of results) and in 2020 (see ES Appendix 13.4: *Intertidal Benthic Ecology Survey Report* (document ref: 6.2.13.4) and ES Appendix 13.5: *Subtidal Benthic Ecology Survey Report* (document ref: 6.2.13.5)).

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Chapter Five ◆ Assessment Process

5.1 The MCZ assessment was carried out in a sequential manner as indicated in the document 'Marine conservation zones and marine licensing' (MMO 2013). At each stage of the process the feature for which the MCZ has been designated, the current status of that feature, and the conservation objectives for the feature, were considered.

SCREENING

5.2 This stage is to determine if Section 126 of the Marine and Coastal Access Act (MCAA) (2009) should apply to the application. This will apply if:

- 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 (other than insignificantly) either:
    - The protected features of the MCZ; or
    - The ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant.

5.3 In determining 'insignificance', the guidance notes that "the public authority will consider 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" (MMO 2013).

5.4 As part of this process, where any MCZ feature was not present at the Proposed Development Site and pathway to effect was not present, it was screened out from further assessment.

STAGE 1 ASSESSMENT

5.5 As indicated above, the conservation objectives for the Swanscombe MCZ are to maintain favourable conditions for the protected habitat and species listed.

5.6 The Stage 1 assessment considered whether the conditions in Section 126(6) would be met. Consequently, it was determined whether:

- there is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ.

5.7 Within this stage of assessment 'hinder' (in the case of a conservation objective of 'maintain'), is considered to be any act that could, either alone or in combination 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. they would be placed on a downward trend), (MMO 2013).

5.8 If the conditions in Section 126(6) cannot be met, the Stage 1 assessment must also consider whether the condition in section 126(7)(a) can be met. In doing so it is necessary to determine 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.

5.9 If it is determined that the proposal can satisfy the conditions in Section 126(6), then no Stage 2 assessment is required and the marine licencing process will continue. If the conditions in Section 126(6) and 126(7) cannot be met, then a Stage 2 assessment will be required.

STAGE 2 ASSESSMENT

5.10 This stage would be undertaken by the decision making authority. The Stage 2 assessment would consider the information supplied by the applicant, together with the DCO application, advice from the SNCBs and any other relevant information to determine:

- Firstly, 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, then;

- Secondly, whether the applicant can satisfy the authority that they will undertake or make arrangements for the undertaking of Measures of Equivalent Environmental Benefit (MEEB) to the damage which the act will, or is likely to have, in or on the MCZ.

5.11 The above determinations are addressed in sequence, that is, if the public benefit test is not 'passed' then a consideration of MEEB would not be made as the application would be rejected. In determining 'public benefit' the decision-making authority will consider benefits at a national, regional or local level.

Chapter Six ◆ Pathways of Effect

6.1 For the Swanscombe MCZ assessment the key activities to be considered in terms of potential effects of the Proposed Development on intertidal mud and tentacled lagoon worm are as follows (see Figures 13.8.2-13.8.4).

CONSTRUCTION ACTIVITIES

- Construction of ferry pontoon with linkspan at Kent Project Site;
- Refurbishment of Bell Wharf (open-piled quay deck) at Kent Project Site;
- Construction of new floating roll on, roll off slipway and linkspan at Kent Project Site (only relevant to Option A);
- Refurbishment/reinforcement of White's Jetty (open-piled quay deck) (only relevant to Option B)
- Dredging at the Kent Project Site (only relevant to Option C);
- Wastewater treatment plant outfall at Kent Project Site. Water released from this facility will be treated prior to discharge to ensure it complies with the relevant legislation. The location of this outfall will be on the north east coast of the Peninsula which is outside the MCZ (~300 m outside the MCZ boundary). As the main effect of the outfall would be to directly affect subtidal substrate and communities via scour it is considered the waste water treatment plant outfall would be too far from the MCZ to have any effect on MCZ features, consequently it is not considered further in this assessment.
- Surface water outfalls. Surface water runoff outfalls will be installed at up to five locations along the Kent Project Site coastline, four of which are within the Swanscombe MCZ. The construction of the outfalls will likely require the construction of temporary cofferdams within the intertidal zone in the MCZ. A single outfall is anticipated to be installed at the Essex Project Site and will be sited to pass between existing infrastructure, however, as indicated in Paragraph 2.5 due to the distance of the Essex Project site from the MCZ this is not considered further in this MCZ assessment. As set out in ES Chapter 17: *Water Resources and Flood Risk* (document ref: 6.1.17), there is potential for on-site activities to influence the water quality of the tidal River Thames. However, pollutant interceptors and siltation controls will be employed and the water will be treated prior to discharge. For full details of proposed mitigation to prevent pollution from surface water runoff entering the tidal River Thames see ES Chapter 17. The residual environmental effects following implementation of these mitigation measures has been assessed to be not significant in ES Chapter 17.

OPERATIONAL ACTIVITIES

- Deliveries to the Ro-Ro facility or White's Jetty at Kent Project Site.
- Use of passenger terminal by London Resort ferry and Clipper ferry at the Kent Project Site.
- Discharge of water from surface water outfalls. The discharge will comply with regulatory requirements from the EA in terms of water quality and any other requirements;
- Maintenance dredging (only relevant to Option C). Note that if Option C is taken forward (which would only be the case if Options A and C prove to be unfeasible), it is the intention that Bell Wharf will only be used during the construction phase and therefore maintenance dredging will not be conducted. If it was decided that Bell Wharf is to be used during operation of the proposed development, however, maintenance dredging may be required periodically which would cause disturbance and re-suspension of sediments. Consequently, consideration of maintenance dredging has been included in the assessment.
- It is confirmed based on site investigations that no form of maintenance dredging would be required for Option A or B.

6.2 Potential effects of the Proposed Development on the full range of marine ecology receptors potentially present at the Project site have been assessed for the Proposed Development in ES Chapter 13: *Marine Ecology and Biodiversity*.

6.3 Consultation comments from NE on the Preliminary Environmental Information Report (PEIR) for the Proposed Development are provided in a table in the Consultation Responses Section at the end of this document.

6.4 No NE Advice on Operations (AoO) is currently available online for Swanscombe MCZ. Consequently, as recommended by NE in comments on the PEIR (see Consultation Responses Section), the pressures assessed in this MCZ assessment are based on proxy AoO from NE for 'Ports and Harbours (Construction activities)'. Following NE advice, this was applied to the tentacled lagoon worm feature from the Medway Estuary MCZ advice package (the nearest appropriate MCZ), and for the intertidal mud feature it was applied to information in the Medway Estuary and Marshes SPA (conservation advice package and AoO) and the Dart Estuary MCZ (supplementary advice) was also reviewed.

6.5 The overall table of pressures is indicated below, and the specific pressures considered for each MCZ feature were based on the AoOs. Note that in relation to Table 6-1, NE guidance defines Medium-High risk pressure as '*pressure is commonly induced by activity at a level that needs to be considered further as part of an assessment*'. Low risk pressures are defined as '*Unless there are evidence based case or site specific factors that increase the risk, or uncertainty on the level of pressure on a receptor, this pressure generally does not occur at a level of concern and should not require consideration as part of an assessment'.*

Table 6-1: Proxy site Medway Estuary MCZ Pressures associated with Ports and Harbours (Construction Activities) and the MCZ feature tentacled lagoon worm. Grey cells indicate pressure screened out of further assessment based on the AoO from Natural England. Definitions of Medium-High risk pressure and Low risk pressures are provided in Paragraph 6.5.

Proxy Site: Medway Estuary MCZ			
Pressures Associated with Ports and Harbours (Construction) and Tentacled Lagoon Worm *Alkmaria romijni*			
Medium-High Risk Pressures	**Interaction type**	**Low Risk Pressures**	**Interaction type**
Abrasion/disturbance of the substrate on the surface of the seabed	Sensitive	Deoxygenation	Not Sensitive
Changes in suspended solids (water clarity)	Not Sensitive	Hydrocarbon and PAH contamination	Not Applicable
Emergence regime changes, including tidal level change considerations	Sensitive	Introduction of other substances (solid, liquid or gas)	Not Applicable
Habitat structure changes – removal of substratum (extraction)	Sensitive	Introduction or spread of invasive non-indigenous species (INIS)	Insufficient Evidence[1]
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	Sensitive	Nutrient enrichment	Not Sensitive
Physical change (to another seabed type)	Sensitive	Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	Not Applicable
Physical change (to another sediment type)	Sensitive	Transition elements and organo-metal (e.g. TBT) contamination	Not Applicable
Physical loss (to land or freshwater habitat)	Sensitive		
Removal of non-target species	Insufficient Evidence		
Smothering and siltation rate changes (heavy)	Sensitive		
Smothering and siltation rate changes (light)	Sensitive		

[1] NE advise unless there are evidence-based case or site specific factors that increase the risk, or uncertainty on the level of pressure on a receptor, this pressure generally does not occur at a level of concern and should not require consideration as part of an assessment.

Proxy Site: Medway Estuary MCZ			
Pressures Associated with Ports and Harbours (Construction) and Tentacled Lagoon Worm *Alkmaria romijni*			
Medium-High Risk Pressures	**Interaction type**	**Low Risk Pressures**	**Interaction type**
Water flow (tidal current) changes, including sediment transport considerations	Sensitive		
Wave exposure changes	Sensitive		

Table 6-2: Proxy site Medway Estuary and Marshes SPA Pressures associated with Ports and Harbours (Construction Activities) and the MCZ feature intertidal mud. Grey cells demonstrate pressure screened out of further assessment based on the AoO from Natural England.

Proxy Site: Medway Estuary and Marshes SPA			
Pressures Associated with Ports and Harbours (Construction) and Intertidal Mud			
Medium-High Risk Pressures	**Interaction type**	**Low Risk Pressures**	**Interaction type**
Abrasion/disturbance of the substrate on the surface of the seabed	Sensitive	Deoxygenation	Not Sensitive
Barrier to species movement	Not Sensitive	Hydrocarbon and PAH contamination	Not Applicable
Changes in suspended solids (water clarity)	Sensitive	Introduction of other substances (solid, liquid or gas)	Not Applicable
Emergence regime changes, including tidal level change considerations	Sensitive	Introduction or spread of invasive non-indigenous species (INIS)	Sensitive
Habitat structure changes – removal of substratum (extraction)	Sensitive	Nutrient enrichment	Not Sensitive
Introduction of light	Not Sensitive	Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	Not Applicable
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	Sensitive	Transition elements and organo-metal (e.g. TBT) contamination	Not Applicable
Physical change (to another seabed type)	Sensitive		
Physical change (to another sediment type)	Sensitive		
Physical loss (to land or freshwater habitat)	Sensitive		

Proxy Site: Medway Estuary and Marshes SPA			
Pressures Associated with Ports and Harbours (Construction) and Intertidal Mud			
Medium-High Risk Pressures	**Interaction type**	**Low Risk Pressures**	**Interaction type**
Removal of non-target species	Insufficient Evidence		
Smothering and siltation rate changes (heavy)	Sensitive		
Smothering and siltation rate changes (light)	Sensitive		
Water flow (tidal current) changes, including sediment transport considerations	Sensitive		
Wave exposure changes	Not Sensitive		

6.6 The low risk pressures in the 3rd column of both Tables 6-1 and 6-2 were not considered at the Stage 1 assessment phase based on NE's recommendations within the AoO, 'unless there are evidence based case or site-specific factors that increase the risk or uncertainty on the level of pressure on a receptor, this pressure generally does not occur at a level of concern and should not require consideration as part of an assessment.' As such no low pressures were considered further within this assessment.

6.7 The only pressure highlighted for both proxy sites for operational activities, which was not already covered under Ports and Harbours (Construction Activities) AoO was 'introduction of light'. For both MCZ features (tentacled lagoon worm and intertidal mud) this pressure it not expected to have a significant effect as it is highlighted within the AoO as a low-risk pressure. Consequently, there is no further consideration of the operational effect 'introduction of light' in this assessment.

6.8 The final pressures taken through for assessment for both features were:

- Abrasion/ disturbance
- Changed in suspended sediments
- Emergence regime changes
- Habitat structure changes
- Penetration and/or disturbance of substratum below surface of seabed
- Physical change (to another seabed type)
- Physical change (to another sediment type)
- Physical loss (to land or freshwater habitat)

- Removal of non-target species
- Smothering and siltation rate change
- Water flow changes
- Wave exposure changes

6.9 Pressures were considered for the construction and operational phase as appropriate.

Chapter Seven ◆ Assessment of Effects

SCREENING

7.1 The table below outlines the outcome of the pathway / receptor screening exercise mentioned above. For the two MCZ features indicated in Table 7-1 it was determined that the features or ecological/geomorphological processes supporting these features could potentially be affected significantly by the activities associated with the Proposed Development. Consequently, they were screened in for Stage 1 assessment. The pressures considered for each MCZ feature during the Stage 1 assessment are indicated in Table 7-2.

Table 7-1: Protected Features in the Swanscombe MCZ

MCZ Screening Assessment	
MCZ site name: Swanscombe MCZ	
Protected Feature	General management approach
Intertidal Mud	Maintain in favourable condition
Tentacled Lagoon Worm (*Alkmaria romijni*)	

Table 7-2: Pressures considered for Swanscombe MCZ features

Protected Feature	Pressure	Potential exposure to pressure and mechanism of effect/impact if known
Intertidal Mud	Abrasion/disturbance	The hazards listed could potentially have an impact on Intertidal mud. The hazards may be caused by the installation of structures, installation of piles, dredging (Option C only) and the accompanying construction work within the Kent Project Site. All construction and operation activities have been considered during the Stage 1 assessment phase.
	Changes in suspended solids	
	Emergence regime changes	
	Habitat structure changes	
	Penetration and/or disturbance of substratum below surface of seabed	
	Physical change (to another seabed type)	
	Physical change (to another sediment type)	
	Physical loss	
	Removal of non-target species	
	Smothering and siltation rate change (light)	
	Water flow changes	
	Abrasion/disturbance	The hazards listed could potentially have an impact
	Emergence regime changes	

Protected Feature	Pressure	Potential exposure to pressure and mechanism of effect/impact if known
Tentacled Lagoon Worm (*Alkmaria romijni*)	Habitat structure changes	on the tentacled lagoon worm. The hazards may be caused by the installation of structures, installation of piles, dredging (Option C only) and the accompanying construction work within the Kent Project Site. All construction and operation activities have been screened in to the Stage 1 assessment phase.
	Penetration and/or disturbance of substratum below surface of seabed	
	Physical change (to another seabed type)	
	Physical change (to another sediment type)	
	Physical loss	
	Smothering and siltation rate change (light)	
	Water flow changes	
	Wave exposure changes	

STAGE 1 ASSESSMENT

7.2 As indicated above, both MCZ features were screened in to Stage 1 Assessment. This has been conducted within the Stage 1 assessment table below with consideration of the pressures indicated in Table 7-2.

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
Feature: Intertidal Mud						
Physical loss (to land or freshwater habitat) (a permanent loss of existing saline habitat within the site) Abrasion/disturbance; Penetration and/or disturbance of substratum below surface of seabed	**Maintain:** The presence and spatial distribution of intertidal mud communities total extent and spatial distribution of intertidal mud; Maintain, Recover, or Restore the abundance of listed species, to enable each of them to be a viable component of the habitat distribution of sediment composition types across the feature; Total organic carbon (TOC) content in the sediment at existing levels; Species composition of component communities; Presence of topographic features while allowing for natural responses to hydrodynamic regime, by preventing erosion or deposition through human induced activity;	**Structure:** Species composition of component communities: sediment character is important in determining the biological communities present (Gray and Elliott, 2009). Varied sediment type and grain size ensure structural complexity and connectivity. **Extent and distribution:** The extent describes the presence and area of the habitat. It's the total area of the habitat across the site as a whole, even where it's patchy. The distribution describes the more detailed location(s) and pattern of habitat across the site. The distribution will influence the component communities present, and also	Yes. **<u>Physical loss</u>** During the construction phase of the London Resort Project, piles (typically 1-2m diameter) will be driven into the seabed to support new structures. Areas of loss of intertidal mud are: **Option A**: There will be four Ro-Ro guide piles in intertidal mud (area of 3.14 sq m); there will also be a loss of intertidal mud in the footprint of the ferry terminal (5,162 sq m – see note in Proposed Development Design section that indicates although the ferry terminal will be on piles the full footprint has been considered as loss of habitat due to considerations of shading and the fact that the number of piles has not yet been finalised; this is considered to be a worst-case scenario precautionary approach). Therefore, the total permanent loss of intertidal mud is 5,165 sq m. This equates to 0.57% of the extent of intertidal mud habitat in the MCZ (based on 906,446 sq m of intertidal mud in the MCZ as calculated from EMODnet (https://emodnet.eu/en)). As indicated in the Abrasion/disturbance; Penetration section below there is also the potential that as a worst-case scenario, cofferdams may need to be constructed to install the surface water outfalls. These are considered to be temporary losses to intertidal mud but calculations are provided in that section indicating potential loss of 4,186 sq m (this is anticipated to be temporary loss as following cofferdam removal after a few months intertidal mud habitat is anticipated to become re-established). If this area is added to the 5,165 sq m indicated above this equates to 9,351 sq m (1% of the extent of intertidal mud habitat in the MCZ).	No wider impacts in surrounding area. No in-combination impacts are anticipated for the MCZ (see Section 8 : In-Combination Assessment, below). Projects in the vicinity of the Proposed Development that were considered for the in-combination assessment were: Tilbury2 port terminal (NSIP ref: TR030003). Maintenance dredging is required every 6 months. Thurrock Flexible Generation Plant (NSIP ref: EN010092). The main marine components of Thurrock Flexible Generation Plant will be the construction of a Ro-Ro causeway and	The mitigation indicated here will be secured by a requirement in the DCO. There will be saltmarsh creation as part of the project to provide Biodiversity Net Gain although this would not be like-for-like replacement of intertidal mud habitat (approximately 3 ha of saltmarsh habitat will be created). It is anticipated, however, that some areas of intertidal mud would also be created as part of these works (ES Appendix 12.3: *Ecological Mitigation and Management Framework*, document ref: 6.2.12.3). Booms or other equivalent	Evidence to support the conclusions below is provided in Column 4. Sensitivity information from MarLIN shows that the intertidal mud habitat and associated species have a 'low' sensitivity to physical disturbance. Overall, in terms of disturbance with Options A, B and C it is considered unlikely the London Resort Project will hinder the achievement of the conservation objectives stated for the MCZ. In relation to habitat change and habitat loss pressures, intertidal mud has a high sensitivity and low resilience. The area of habitat loss with Options A, B and C is relatively small (~0.6% of the extent of intertidal mud in the MCZ). *A. romijni* seems to mainly be present subtidally at this location with no *A. romijni* individuals recorded in intertidal samples collected during project-specific surveys in 2015 and 2020 (Appendix 13.4: *Intertidal Benthic Ecology Survey Report* (document ref: 6.2.13.4). Other species found within intertidal mud habitats are widespread within the tidal Thames.

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
	Natural physical energy resulting from waves; Natural physico-chemical properties of the water; Sediment transport pathways to and from the feature; Dissolved oxygen (DO) concentration at levels equating to High Ecological Status water quality at mean winter dissolved; Inorganic nitrogen levels; Natural levels of turbidity. **Restrict:** Aqueous contaminants to levels equating to High Status; The introduction and spread of non-native species and pathogens, and their impacts. **Reduce:** Surface sediment contaminants	help increase the health and resilience of the feature (Joint Nature Conservation Committee (JNCC, 2004). A reduction in extent would alter the biological and physical functioning of the feature (Elliott *et al*., 1998).	**Option B**: Refurbishment/reinforcement of White's Jetty will not involve installation of piles. For this option there will be a loss of intertidal mud in the footprint of the ferry terminal (5,162 sq m) – total loss of intertidal mud of 5,162 sq m. This equates to 0.57% of the extent of intertidal mud habitat in the MCZ. If including the anticipated temporary loss of intertidal mud of 4,186 sq due to installation of temporary cofferdams for surface water outfall construction this equates to 1% of the extent of intertidal mud habitat in the MCZ. **Option C**: If Option C is to be undertaken dredging will primarily take place within the subtidal area of the Thames, however, there is a small area of intertidal mud within the dredge pocket (628 sq m). As with the other options, there will also be a loss of intertidal mud in the footprint of the ferry terminal (5,162 sq m). Therefore, the total loss of intertidal mud for this option is 5,790 sq m which equates to 0.64% of the extent of intertidal mud in the MCZ. If including the anticipated temporary loss of intertidal mud of 4,186 sq m due to installation of temporary cofferdams for surface water outfall construction this equates to 9,976 sq m (1.1% of the extent of intertidal mud habitat in the MCZ). Maintenance dredging is not anticipated to be required for **Option C**. If it is conducted, however, the extent of dredging will be far smaller than the capital dredge and would be infrequent and is unlikely to have any further influence on intertidal sediments. Maintenance dredging will not be required for **Option A or B.** For **Option A, B and C** there will also be a small area of disturbance around the piles during piling. This disturbance	capital dredging. Construction is expected to start in 2021 for the majority of the Proposed Development including the marine components. Construction is expected to take either 1-2 years or 3-6 years depending on the options chosen for the construction programme The Pier, by Crest Nicholson (Dartford Borough Council, 17/01814/FUL) The boat jetty will require piling from a jack- up barge. However, construction for this site was due to finish in June 2020 and so there should not be any cumulative effects for construction of the Pier with the London Resort Project.	infrastructure will be installed at the ferry terminal and jetties to minimise potential for erosion caused by boat wash	Cofferdams may be constructed in the intertidal zone to construct the surface water outfalls, however, they would be temporary (anticipated to be in place for a few months). Therefore, for Options A, B and C it is considered unlikely the Proposed Development will hinder the achievement of the conservation objectives stated for the MCZ for intertidal mud. <u>Discussion will be conducted with NE to determine options to minimise potential effects of the Proposed Development on the intertidal mud MCZ feature.</u>

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
			will be temporally and spatially limited to the immediate area of the pile locations. Overall, the area of intertidal mud habitat potentially permanently lost by the London Resort Project during construction is very small in relation to the availability of this habitat in the MCZ for Options A, B and C. **<u>Abrasion/disturbance; Penetration</u>** **Option A, B and C:** During the works indicated above there will be disturbance of substrate in the immediate vicinity of the substrate lost, however, such disturbance is expected to be highly localised (within a number of metres of e.g. a pile location). There is potential for scour of sediment at the discharge points for the surface water outfalls (four outfalls in the MCZ). Although exact discharge volumes are not yet known any areas of abrasion/disturbance caused by scour will be highly localised around the discharge point. During the construction and operation phases vessel movements there will be increased vessel activity. For the purposes of assessment, the upper limit for daily barge movements during construction is likely to be the capacity of the berths at the resort site, this has been assessed at 10 barge movements per day, (ES Appendix 10.1: *Preliminary Navigational Risk Assessment*, document ref: 6.2.10.1) across the Kent and Essex Project Sites. It is likely that piles may be installed by a vessel such as a jack up barge as a worst-case scenario. There may also be floating cranes, safety boats or supply vessels. For further information in relation to the vessel activity during construction including vessel routes and size of vessels see ES Appendix 10.1: *Preliminary Navigational Risk Assessment*, document ref: 6.2.10.1.	Purfleet Centre Regeneration will redevelop land on the north bank of the tidal River Thames in Purfleet city centre. The marine elements of this project are limited to replacement of parts of the river wall and flood defences (including piling) and the provision of surface water runoff outfalls. The overall construction programme is from 2019 until 2034. The Tilbury Energy Centre would include construction and operation of intakes and outfalls, piling for a jetty and dredging. It is currently on a Project Freeze.		

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
			During operation it is anticipated that there would be 27 passenger vessel movements per day between upstream locations and London Resort (extension of existing route) and 42 passenger vessel movements per day between London Resort and Tilbury (new passenger ferry services), (ES Appendix 10.1: *Preliminary Navigation Risk Assessment,* document ref: 6.2.10.1). Most of these vessel movements, however, will be restricted to the subtidal zone and would not operate in intertidal areas at high water. For further information in relation to the vessel activity during operation including vessel routes and size of vessels see ES Appendix 10.1: *Preliminary Navigational Risk Assessment*, document ref: 6.2.10.1. Such vessel movements can cause localised scour of the seabed. No vessels will directly rest on the intertidal area limiting the direct impacts from abrasion, however, indirect scour could occur due to vessel docking and prop wash. It should be noted that an aspect of embedded mitigation for the Proposed Development for operation is the installation of booms or other equivalent infrastructure at the ferry terminal and jetties to minimise potential for erosion caused by boat wash (this will be secured as a requirement of the DCO). Any disturbance of sediments due to vessel movements is anticipated to be highly localised and would vary across days depending on the location of vessels. The area of habitat potentially affected in relation to available habitat in the area is considered to be very small. Intertidal communities mapped in the area based on results of the project-specific intertidal surveys conducted in 2020 (see ES Appendix 13.4: *Intertidal Benthic Ecology Survey Report* (document ref: 6.2.13.4)) were fairly homogeneous with the six discrete cluster groups being assigned to one of four habitats. Most samples were either assigned to the habitat *Hediste diversicolor* and *Streblospio shrubsolii* in littoral sandy			

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
			mud (LS.LMu.UEst.Hed.Str; EUNIS A2.3221) (10 stations) or *Hediste diversicolor* and *Corophium volutator* in littoral mud (LS.LMu.UEst.Hed.Cvol; EUNIS A2.3222) (6 stations). A key consideration is that these intertidal mud habitats are indicated to have Low sensitivity and High resilience to abrasion/disturbance and penetration in the Marine Life Information Network (MarLIN) Marine Evidence-Based Sensitivity Assessment (MarESA) assessment (Ashley and Budd 2020a & b) and the turbidity of the surrounding environment it is not likely to cause a significant effect. Overall, the effects of vessel movements on intertidal mud are not expected to be significant. There is also the potential for installation of surface water outfalls at up to four intertidal locations within the MCZ area which could involve disturbance through scour, and removal of intertidal mud. As a worst-case scenario, cofferdams may need to be constructed to install the outfalls. For the purposes of assessment it is currently assumed that cofferdam construction/saltmarsh removal could occur along approximately 60 to 355 m of intertidal mud depending on location, with a width of 7 m. Overall, it is anticipated that across the four locations there could be removal of approximately 4,186 sq m of intertidal mud during installation of the outfalls/cofferdams. There could also be further disturbance of intertidal mud during construction due to presence of personnel and plant. The cofferdam, however, would be temporary (anticipated to be in place for a number of months) and on removal of the cofferdam it is anticipated that intertidal mud which was within the footprint of the cofferdams would become re-established. As indicated above, intertidal mud and the habitats previously mentioned have a low sensitivity and high resilience assessment to disturbance therefore the temporary effects of cofferdam installation is not considered likely to cause a long-terms significant effect on the intertidal mud feature.			

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
Changes in suspended solids Smothering and siltation rate change (light)		**Supporting processes - water quality - turbidity:** Water turbidity is a result of material suspended in the water, including sediment, plankton, pollution or other matter washed into the sea from land sources. Prolonged changes in turbidity may influence the amount of light reaching the seabed, affecting the primary production and nutrient levels of the habitat's associated communities. Changes in turbidity may also have a range of biological effects on different species within the habitat, e.g. affecting their abilities to feed or breathe. A prolonged increase in turbidity is indicative of an increase in suspended particulates. This has a number of implications for the	Yes. **<u>Change in suspended solids; Change in smothering and siltation rate</u>** **Option A, B and C:** Where piling or dredging (**Option C only**) takes places there is the potential for changes in suspended solids and an increase in smothering and siltation rates. With piling for the new structures there could be a localised and temporary change in suspended sediments but project-specific hydrodynamic modelling has indicated there would be no effect on the suspended sediment concentrations (SSC) for **Option A and B** and also for **Option C** (based on backhoe dredging) taking into account the high baseline levels of SSC (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). In addition, intertidal mud has a low sensitivity to these pressures. Maintenance dredging is not anticipated to be required for **Option C**. If it is conducted, however, the extent of dredging will be far smaller than the capital dredge. Maintenance dredging will not be required for **Option A or B.** Overall, given the high resilience and not sensitive assessment of the feature to the pressure (MarLIN MarESA Ashley and Budd 2020a & b) and the turbidity of the surrounding environment, any effects are considered to be minimal.			

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
		marine environment, such as affecting fish health, clogging the filtering organs of suspension feeding animals and affecting seabed sedimentation rates (Elliott *et al.,* 1998).				
Habitat structure changes		**Structure - species composition of component communities:** species composition of communities includes a consideration of both the overall range of species present within the community, as well as their relative abundance. Species composition could be altered by human activities without changing the overall community type. Within each component community, species composition and population structure should be taken into consideration to	**<u>Habitat structure changes</u>** **Option C:** If dredging is conducted (Option C only) it has the potential to cause long term or temporary habitat structure changes to the intertidal mud. This will likely be a reversible change as communities will be able to re-colonise the dredged area post-dredging as the sediment type present within the dredge pocket may not change, however, the intertidal area within the dredge pocket will become mainly subtidal after the dredging leading to potential changes in the biotic communities present. The area of intertidal mud within the dredge pocket is equivalent to 0.07% of the extent of intertidal mud in the MCZ. Maintenance dredging is not anticipated to be required for **Option C**. If it is conducted, however, the extent of dredging will be far smaller than the capital dredge. Maintenance dredging is not required for **Option A or B**. Overall, for **Option C** the potential for habitat structure changes is highly localised and temporary and is not anticipated to be significant. For **Option A and B** there is no dredging and any habitat structure changes are expected to be insignificant.			

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
Removal of non-target species		avoid diminishing biodiversity and affecting ecosystem functioning within the habitat (Joint Nature Conservation Committee (JNCC), 2004). The sediment community composition will change when the habitat is subjected to pollutants and other forms of disturbance (Joint Nature Conservation Committee (JNCC), 2004), but will also be subject to significant natural variation annually. Benthic invertebrate communities are a good indicator of the health of the feature, if assessed over time.	**<u>Removal of non-target species</u>** **Option C:** Dredging associated with Option C will result in the physical removal of substrate including removal of some species within the area. In general, the species within the dredge pocket are expected to be widespread within intertidal habitats in the wider Thames Estuary as well as in the MCZ, The resilience of intertidal mud to this pressure is assessed to be High and sensitivity is Low in the MarLIN MarESA (e.g. Ashley and Budd 2020a and b). For **Option A and B** no sediment removal activities are anticipated to be required.			

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
Physical change (to another seabed type) Physical change (to another sediment type)		**Structure - sediment composition and distribution:** sediment character is important in determining the biological communities present (Gray and Elliott, 2009). Varied sediment type and grain size ensure structural complexity and connectivity.	**<u>Physical change (to another seabed type; to another sediment type)</u>** **Option C:** Should Option C be undertaken, dredging has the potential to cause physical change to sediment type and indirect habitat structure changes. Dredging will primarily take place within the subtidal area of the Thames. However, there is an area of intertidal mud within the dredge pocket which is equivalent to 0.3% of the extent of this habitat type in the MCZ. It is unclear how much of this area would be subject to change in substrate type (i.e. proportion of mud, sand and gravel) due to the dredging but the resilience of the habitats present to change in sediment type is Very low and sensitivity is High (MarLIN MarESA, Ashley and Budd 2020a and b). **Option A, B and C:** The very limited impacts predicted for hydrodynamics (see below) are reflected by the prediction of effects on sediment transport and erosion/deposition. No discernible effect is seen on suspended sediment concentration for all the options studied. At Swanscombe the various structures result in very localised and small scale potential changes to the distribution of sediments increasing the proportion of 5 mm gravel in the area north east of White's Jetty (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). In addition, a coarsening of the bed sediment under the passenger pontoon may occur depending on the nature of the existing bed in this area. If the dredging associated with **Option C** is taken forward an annual infill rate of up to 29,700 m^3 per year is predicted but the sediment infilling the dredge areas is likely to be similar to the substate removed. This is a precautionary total as the rate will reduce as the dredged area fills and vessel effects will also resuspend fine sediment (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). No effects on the erosion or deposition patterns are seen on the intertidal areas near the Swanscombe site for **Option A, B**			

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
			and C (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). **Option A, B and C:** Based on modelling outputs habitat creation areas on the east of the peninsula are anticipated to receive more fine sediment than those on the west (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4).			
Water flow changes Emergence regime changes		**Supporting processes - sediment movement and hydrodynamic regime:** sedimentary habitats are often influenced by tide and wave-driven water flow that drives the movement or stability of sediment on and in areas surrounding the feature. These flow regimes can control both the shape and size of the feature, in addition to its sedimentary characteristics and biological composition. It's important that these hydrodynamic and sedimentary processes persist and are allowed to change in response	**<u>Water flow changes; Emergence regime changes</u>** Installation of structures may alter flow speed and direction. The results indicated below are based on operation and would be reduced in scales during the construction phase as structures are installed over time. **Option A:** Modelling results indicate that due to the presence of structures installed for the Proposed Development for Option A, there could be a localised reduction in current speed of 0.05 to 0.1 m/s over a distance of 800 m on a peak ebb tide reducing to 600 m on a peak flood tide. Speed reductions of 0.1 to 0.2 m/s are evident over a distance of 300 m (peak flood tide) to 400 m (peak ebb tide). These effects are due to the introduction of blockage to the passing flow by the two pontoons (Ro-Ro and passenger pontoon) and drag effect of the piles (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). **Option B:** For Option B (without the Ro-Ro pontoon) reductions in current speed were modelled to have a smaller footprint over a distance of 400 m on the peak ebb and flood tides and remained within the range 0.05 to 0.1 m/s with only small spots of speed reduction greater than 0.1 m/s seen close to White's Jetty (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4).			

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
		to environmental conditions without hindrance. Hydrodynamic conditions include the speed and direction of wave and tidal currents, seabed shear stress and wave exposure (Little, 2000), (Elliott et al., 1998).	**Option C:** Dredging under Option C will change the natural tidal range on small sections of the intertidal zone and potentially affect water flow. The hydrodynamic assessment has indicated potential reductions in current speed of 0.05 to 0.2 m/s over a distance of 700 m on a peak ebb tide and 600 m on a peak flood tide. At the time of peak ebb tide the area of larger changes in currents which might have an effect on other estuary processes is restricted to the immediate area of the dredging, extending from the new passenger pontoon to White's Jetty. Within this area the modelling indicates some areas of speed reduction 0.2 m/s to 0.3 m /s. On a peak flood tide, speed reductions of 0.05 to 0.2 m/s are modelled over a distance of 500 m, extending from the dredged area towards the north west of White's Jetty (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). **Option A, B and C:** For all options, on the ebb tide, small spots of speed increase are shown by the new breaches out of the habitat creation areas (see Proposed Development Design section above). This is likely due to the water flowing out of the habitat creation areas as they dry out (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). Small spots of speed increase are also evident at the time of peak flood. However, as the time of peak flood is closer to high water, when the habitat areas are flooded these small areas of increase are surrounded by areas of speed decrease. This is due to the interaction of the passing flow with that entering the habitat areas and the increased flow cross section area present when the habitat areas are inundated (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4) and these effects are limited to the immediate area of the habitat areas. **Option C:** The main change to emergence regime will be that some of the small area of intertidal habitat in the dredge pocket would become subtidal as indicated above. The area of			

Stage 1 MCZ Assessment						
Pressure	**Favourable condition targets for relevant features based on conservation objectives**	**Contribution of attribute to ecological structure and function of site**	**Capable of affecting either the protected features of the MCZ or any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependant?**	**Will there be impacts in combination with other plans or projects, on attribute and/or feature?**	**Can impacts be mitigated?**	**Is there a significant risk to the conservation objectives being hindered?**
			intertidal mud within the dredge pocket is equivalent to 0.07% of the extent of intertidal mud in the MCZ.			
Feature: Tentacled Lagoon Worm						
Physical loss (to land or freshwater habitat) Abrasion/disturbance; Penetration and/or disturbance of substratum below surface of seabed	**Maintain:** Maintain the population size within the site; Maintain the reproductive and recruitment capability of the species; The presence and spatial distribution of the species; Maintain connectivity of the habitat within sites and the wider environment to ensure larval dispersal and recruitment, and / or to allow movement of migratory species;. Maintain the extent and spatial distribution of the following supporting habitats: intertidal mud; Maintain the distribution of sediment composition across the habitat, allowing for natural succession / cyclical change, and input of fresh sediment to	**Extent and distribution:** The extent describes the presence and area of the habitat. It's the total area of the habitat across the site as a whole, even where it's patchy. The distribution describes the more detailed location(s) and pattern of habitat across the site. The distribution will influence the component communities present, and also help increase the health and resilience of the feature. Species is protected under section 9 and schedule 5 of the Wildlife and Countryside Act, listed as a Feature of Conservation	Yes. **<u>Physical loss</u>** During the construction phase of the London Resort Project, piles (typically 1-2m diameter) will be driven into the seabed to support new structures. Areas of loss of subtidal mud are: **Option A:** There will be two Ro-Ro guide piles of 2 m diameter in the subtidal zone (area of 6.28 sq m) and two piles of 0.9 m diameter in the subtidal zone for the passenger jetty (area of 1.27 sq m) = 7.6 sq m footprint in the subtidal zone. As indicated above, for intertidal mud the total permanent loss of habitat would be 5,165 sq m. Therefore, the total area lost is 5,172 sq m which equates to 0.15% of the extent of the MCZ (which has total extent of 3,352,118 sq m (i.e. ~3 km^2, for intertidal and subtidal). If the 4,186 sq m is included for potential temporary loss of intertidal mud in the footprint of the cofferdams which may be required for construction of surface outfalls, the area lost is 9,358 sq m which equates to 0.28% of the extent of the MCZ. **Option B:** Refurbishment/reinforcement of White's Jetty will not involve installation of piles. For Option B, the only footprint in the subtidal zone would be the two 0.9 m piles for the floating pontoon (with an area of 1.3 sq m.). There will also be a loss of intertidal mud in the footprint of the ferry terminal (5,162 sq m) – total loss of habitat of 5,163.3 sq m. This equates to 0.15% of the extent of the MCZ (intertidal and subtidal).	No wider impacts in surrounding area. No in-combination impacts are anticipated for the MCZ (see Section 8 : In-Combination Assessment, below). Projects in the vicinity of the Proposed Development that were considered for the in-combination assessment were: Tilbury2 port terminal (NSIP ref: TR030003). Maintenance dredging is required every 6 months. Thurrock Flexible Generation Plant (NSIP ref: EN010092). The main marine components of Thurrock Flexible Generation Plant	The mitigation indicated here will be secured by a requirement in the DCO. Mitigation measures in place to reduce impacts on tentacled lagoon worms include: Using smaller piles which will require less force to install; Appropriate bunding and spill containment equipment on site; Use of well maintained equipment and plant to minimise potential fuel / oil and chemical spills (ES Appendix 3.2: *Outline Construction and Environmental Management Plan*, document ref: 6.2.3.2).	Evidence to support the conclusions below is provided in Column 4. In relation to habitat change and habitat loss pressures, tentacled lagoon worm has a high sensitivity and low resilience. However, the potential permanent area of habitat loss with Options A and B is relatively small (0.15% of the extent of the MCZ for Option A and B). *A. romijni* seems to mainly be present subtidally at this location with no *A. romijni* individuals recorded in intertidal samples collected in 2015 and 2020 surveys. Cofferdams may be constructed in the intertidal and subtidal zone to construct the surface water outfalls, however, they would be temporary (anticipated to be in place for a few months). The potential area of combined intertidal and subtidal sediment lost permanently for Options A and B is an order of magnitude less than for Option C. Overall, it is considered that Options A and

Stage 1 MCZ Assessment						
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	maintain the lagoon regime; Maintain the natural physico-chemical properties of the water; Maintain all hydrodynamic and physical conditions such that natural water flow and sediment movement is not significantly altered or constrained; Natural dissolved oxygen (DO) levels; Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features, avoiding deterioration; Restore: Aqueous contaminants to levels equating to (High / Good) Status (according to Annex VIII and X of the Water Framework Directive), avoiding deterioration from existing levels;	Importance in England and Wales, is listed as Nationally scarce.	If the 4,186 sq m is included for potential temporary loss of intertidal mud in the footprint of the cofferdams which may be required for construction of surface outfalls, the area lost is 9,349.3 sq m which equates to 0.28% of the extent of the MCZ. **Option C:** If Option C is to be undertaken, dredging will primarily take place within the subtidal area of the Thames, however, there is also a small area of intertidal mud within the dredge pocket. The total area of the dredge pocket is 77,430 sq m (76,802 sq m in the subtidal and 628 sq m in the intertidal). As with the other options, there will also be a loss of intertidal mud in the footprint of the ferry terminal (5,162 sq m). Therefore, the total loss of intertidal and subtidal mud for this option is 82,592 sq m which equates to 2.5% of the extent of the MCZ (sum of extent of intertidal and subtidal habitat). If the 4,186 sq m is included for potential temporary loss of intertidal mud in the footprint of the cofferdams which may be required for construction of surface outfalls, the area lost is 86,778 sq m which equates to 2.6% of the extent of the MCZ. Maintenance dredging is not anticipated to be required for **Option C**. If it is conducted, however, the extent of dredging will be far smaller than the capital dredge and it would be infrequent. Maintenance dredging will not be required for **Option A or B.** For **Option A, B and C** there will also be a small area of disturbance around the piles during piling and an area of scour at the surface water outfalls. This disturbance will be temporally and spatially limited to the immediate area of the pile locations and surface water discharge locations. **Options A, B and C:** When considering the impact on aggregations of tentacled lagoon worm, historic data indicate they are primarily congregated around Greenhithe (Figure	will be the construction of a Ro-Ro causeway and capital dredging. Construction is expected to start in 2021 for the majority of the Proposed Development including the marine components. Construction is expected to take either 1-2 years or 3-6 years depending on the options chosen for the construction programme. The Pier, by Crest Nicholson (Dartford Borough Council, 17/01814/FUL) The Pier Project is for the construction of a substructure basement for mixed residential development together with adjacent launching jetty for small boats. It will be directly adjacent to the western boundary of the Kent Project		B pose less risk than Option C to potentially hindering the achievement of the conservation objectives stated for the MCZ. This view has been agreed in advice from NE (Ref: DAS 6848, received 10/12/2020). For this reason Option C will only be pursued if Options A and B prove to be unfeasible. AoO for tentacled lagoon worm indicates a wide range of medium-high risk pressures, to which tentacled lagoon worm are indicated to be sensitive. For some of these such as changes in smothering and siltation rates and water flow changes, modelling has indicated any changes due to the Proposed Development would be insignificant. However, NE has advised that **Stage 2 assessment will likely be required for Option A and B** in particular for loss of habitat and habitat disturbance. <u>Discussion will be held with NE/MMO to determine options to minimise potential effects of the Proposed Development on tentacled lagoon worm</u> With Option C there will be a larger area of habitat loss/disturbance in the

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			13.8.7), which is to the south-east of the London Resort Project (Figure 13.8.1 and 13.8.7). However, a small number of historic records are also in proximity to the proposed new ferry pontoon (passenger jetty) area (13.8.1 and 13.8.7). A survey in 2015 also sampled six stations in the vicinity of the proposed works area (but none of these were in the current proposed dredge area). During this survey a high number of individuals was recorded at one of the stations (2,840 individuals m^{-2}), no individuals were recorded at two of the stations and densities at the remaining three stations were 300, 190 and 10 individuals m^{-2}. A project-specific subtidal grab survey was conducted in September 2020, with four stations within the dredge pocket and four more within 100 m of the dredge pocket (only applicable for Option C), (see Appendix 13.5: *Subtidal Benthic Ecology Survey Report* of the ES). The results of this survey indicated that out of the eight grab stations in and around the dredge pocket, no tentacled lagoon worms were recorded at five of the stations including the station in the immediate vicinity of the proposed ferry terminal (see Appendix 13.5: Subtidal Benthic Ecology Survey Report of the ES). For **Option C**, at a station in the east of the dredge pocket a density of 20 tentacled lagoon worms individuals m^{-2} was recorded, and a density of 40 individuals m^{-2} was recorded at the station within the dredge pocket near White's Jetty. The only other station at which tentacled lagoon worms were recorded was approximately 150 m west of the dredge pocket (20 tentacled lagoon worms m^{-2}). **Options A, B and C:** A project-specific intertidal survey was conducted in August 2020 and no tentacled lagoon worm individuals were recorded within intertidal habitats across the Kent Project Site (see Appendix 13.4: *Intertidal Benthic Ecology Survey Report* of the ES). This was also the case for an intertidal survey conducted for the project in 2015 (see Appendix 13.2: *Marine Ecology and Biodiversity Baseline* of the ES for summary of results).	Site. The boat jetty will require piling from a jack- up barge. However, construction for this site was due to finish in June 2020 and so there should not be any cumulative effects for construction of the Pier with the London Resort Project. The Tilbury Energy Centre would include construction and operation of intakes and outfalls, piling for a jetty and dredging. It is currently on a Project Freeze.		intertidal/subtidal zone. With the area potentially lost equating to 2.5% of the available intertidal/subtidal habitat in the MCZ it is considered that there is a significant risk that the conservation objectives would be hindered in terms of habitat loss and disturbance. With this being the case, according to section 126(7)(a) for the MCAA, it would be necessary that the developer satisfies the authority of some stated conditions including 'there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of those objectives'. The alternative Options A and B have been considered in this assessment. However, **if Option A and B are found to not be feasible then a Stage 2 assessment would be required for Option C.**

Stage 1 MCZ Assessment						
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			With **Options A and B** the proportion of subtidal habitat in the MCZ potentially disturbed is very small in relation to the proportion of subtidal habitat in the MCZ. In addition, based on the distribution of tentacled lagoon worm individuals in the MCZ to the south-west of the site it is expected the numbers of individuals potentially affected is relatively small in relation to the population within the MCZ although more accurate estimations of the population size of tentacled lagoon worm in the MCZ would be required to verify this. The combined area of intertidal and subtidal habitat potentially affected by the Proposed Development during construction is notably greater for **Option C** than for **Option A and B.** Physical loss of habitat is indicated to be a medium-high risk pressure in NE's AoO for tentacled lagoon worm and tentacled lagoon worm is indicated to be sensitive to this pressure (see Table 6-1). **Option C:** Should dredging take place there will be the potential for recolonisation of the dredge pocket by tentacled lagoon worm from nearby areas if suitable substrate settles in the dredge pocket. Consequently, in general it is considered that any effects of dredging on population numbers would likely be temporary. It is acknowledged, however, that increases in depth or change in substrate type could result in sediment within the dredge pocket being unsuitable for tentacled lagoon worm colonisation and if there was maintenance dredging this would result in further disturbance of individuals. **<u>Abrasion/disturbance; Penetration</u>** **Option A, B and C:** During the works indicated above there will be disturbance of substrate in the immediate vicinity of the substrate lost, however, such disturbance is expected to be highly localised (within a number of metres of e.g. a pile location).			

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			Option A, B and C: There is potential for scour of sediment at the discharge points for the surface water outfalls (four outfalls in the MCZ). Although exact discharge volumes are not yet known any areas of abrasion/disturbance caused by scour will be highly localised around the discharge point. Consequently, any effects on tentacled lagoon worm would be restricted to a very small spatial scale. **Option A, B and C:** During the construction and operation phases vessel movements there will be increased vessel activity. For the purposes of assessment, the upper limit for daily barge movements during construction is likely to be the capacity of the berths at the resort site, this has been assessed at 10 barge movements per day, (ES Appendix 10.1: *Preliminary Navigational Risk Assessment*, document ref: 6.2.10.1) across the Kent and Essex Project Sites. It is likely that piles may be installed by a vessel such as a jack up barge, there may be floating cranes, safety boats or supply vessels. During operation it is anticipated that there would be 27 passenger vessel movements per day between upstream locations and London Resort (extension of existing route) and 42 passenger vessel movements per day between London Resort and Tilbury (new passenger ferry services), (ES Appendix 10.1: *Preliminary Navigation Risk Assessment,* document ref: 6.2.10.1). For further information in relation to the vessel activity during construction and operation including vessel routes and size of vessels see ES Appendix 10.1: *Preliminary Navigational Risk Assessment*, document ref: 6.2.10.1. **Option A, B and C:** Such vessel movements can cause localised scour of the seabed. No vessels will directly rest on the intertidal area limiting the direct impacts from abrasion however indirect scour could occur due to vessel docking and prop wash. In addition, Any disturbance of sediments due to vessel movements is anticipated to be highly localised and			

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			would vary across days depending on the locations of vessels. The area of habitat potentially affected in relation to available habitat in the area is considered to be very small. Tentacled lagoon worm is indicated to have a Low sensitivity and High resilience to abrasion/disturbance and penetration in the MarLIN MarESA assessment (Tyler-Walters and White 2017). However, abrasion/disturbance and penetration are indicated to be medium-high risk pressures in NE's AoO for tentacled lagoon worm and tentacled lagoon worm is indicated to be sensitive to these pressures in the AoO (see Table 6-1). **Option A, B and C:** Installation of surface water outfalls at up to four locations within the MCZ area could involve disturbance, through scour, and removal of intertidal mud which could potentially affect tentacled lagoon worm although no individuals were recorded in intertidal core samples during project specific survey (see ES Appendix 13.4: *Intertidal Benthic Ecology Survey Report* (document ref: 6.2.13.4)). As a worst-case scenario, cofferdams may need to be constructed to install the outfalls. For the purposes of assessment it is currently assumed that cofferdam construction/saltmarsh removal could occur along approximately 60 to 355 m of intertidal mud depending on location, with a width of 7 m. Overall, it is anticipated that across the four locations there could be removal of approximately 4,186 sq m of intertidal mud during installation of the outfalls/cofferdams and there would also be a small footprint of the cofferdam in the subtidal zone. There could also be further disturbance of intertidal mud during construction due to presence of personnel and plant. The cofferdam would be anticipated to be in place for a number of months therefore limiting its impact on a temporal scale.			

Stage 1 MCZ Assessment						
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Smothering and siltation rate change (light)		**Supporting processes - water quality - turbidity:** Water turbidity is a result of material suspended in the water, including sediment, plankton, pollution or other matter washed into the sea from land sources. Prolonged changes in turbidity may influence the amount of light reaching the seabed, affecting the primary production and nutrient levels of the habitat's associated communities. Changes in turbidity may also have a range of biological effects on different species within the habitat, e.g. affecting their abilities to feed or breathe. A prolonged increase in turbidity is indicative of an increase in suspended particulates. This has a number of implications for the marine environment,	Yes. **<u>Change in smothering and siltation rate (light)</u>** Where piling or dredging takes places there is the potential for an increase in smothering and siltation rates. **Option A, B and C:** With piling for the new structures there is likely to be a localised and temporary change in suspended sediments. Where "light" smothering occurs most benthic biota are able to adapt, i.e. vertically migrate through the deposited sediment. The MarLIN MarESA indicates the resilience of tentacled lagoon worm to this pressure is High and sensitivity to the pressure is Low, however confidence in this assessment is also indicated as low. NE's AoO for tentacled lagoon worm indicates smothering and changes in siltation rate are medium-high risk pressures for tentacled lagoon worm and tentacled lagoon worm is indicated to be sensitive to these pressures in the AoO (see Table 6-1). Project-specific hydrodynamic modelling, however, has indicated there would be no effect on the suspended sediment concentrations (SSC) for Options A and B and also for Option C (based on backhoe dredging) taking into account the high baseline levels of SSC (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). Considering the turbidity of the River Thames any increases in siltation rates will likely be temporary and small scale relative to natural variability and it is not likely to cause a significant effect.			

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		such as affecting fish health, clogging the filtering organs of suspension feeding animals and affecting seabed sedimentation rates (Elliott *et al.,* 1998).				
Habitat structure changes		**Structure - species composition of component communities:** species composition of communities includes a consideration of both the overall range of species present within the community, as well as their relative abundance. Species composition could be altered by human activities without changing the overall community type. Within each component community, species composition and population structure should be taken into consideration to avoid diminishing biodiversity and affecting ecosystem functioning within	**<u>Habitat structure changes</u>** **Option C:** If dredging is conducted (Option C only) it has the potential to cause long term or temporary habitat structure changes. It is anticipated that this will likely be a reversible change with communities able to re-colonise the dredge pocket. The resilience of tentacled lagoon worm is medium to habitat structure changes and sensitivity is also medium. NE's AoO for tentacled lagoon worm indicates habitat structure changes is a medium-high risk pressure for tentacled lagoon worm and tentacled lagoon worm is indicated to be sensitive to this pressure in the AoO (see Table 6-1). For **Option A and B** there is no dredging and any habitat structure changes are expected to be insignificant.			

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		the habitat (Joint Nature Conservation Committee (JNCC), 2004). The sediment community composition will change when the habitat is subjected to pollutants and other forms of disturbance (Joint Nature Conservation Committee (JNCC), 2004), but will also be subject to significant natural variation annually. Benthic invertebrate communities are a good indicator of the health of the feature, if assessed over time.				

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Physical change (to another seabed type) Physical change (to another sediment type)		**Structure - sediment composition and distribution:** sediment character is important in determining the biological communities present (Gray and Elliott, 2009). Varied sediment type and grain size ensure structural complexity and connectivity.	**<u>Physical change (to another seabed type; to another sediment type)</u>** **Option C:** Should Option C be undertaken, dredging has the potential to cause physical change to sediment type and indirect habitat structure changes. The dredge area is equivalent to 2.5% of the extent of the MCZ (intertidal and subtidal habitat). The sensitivity of tentacled lagoon worm to change in sediment type is High (MarLIN MarESA, Tyler-Walters and White 2017). **Option A, B and C:** The very limited impacts predicted for hydrodynamics (see above) are reflected by the prediction of effects on sediment transport and erosion/deposition. No discernible effect is seen on suspended sediment concentration for all the options studied. At Swanscombe the various structures result in a potential change to the distribution of sediments increasing the proportion of 5 mm gravel in the area north east of White's Jetty (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). In addition, a coarsening of the bed sediment under the passenger pontoon may occur depending on the nature of the existing bed in this area. If the dredging associated with Option C is taken forward an annual infill rate of up to 29,700 m^3 per year is predicted but the sediment infilling the dredge areas is likely to be similar to the substate removed. This is a precautionary total as the rate will reduce as the dredged area fills and vessel effects will also resuspend fine sediment (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). No effects on the erosion or deposition patterns are seen on the intertidal areas near the Swanscombe site for any of the options (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4).			

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			Consequently, for all options any changes in sediment type and subsequent effects on tentacled lagoon worm are anticipated to be insignificant. **Option A, B and C:** Based on modelling outputs habitat creation areas on the east of the peninsula are anticipated to receive more fine sediment than those on the west (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4).			
Water flow changes Emergence regime changes		**Supporting processes - sediment movement and hydrodynamic regime:** sedimentary habitats are often influenced by tide and wave-driven water flow that drives the movement or stability of sediment on and in areas surrounding the feature. These flow regimes can control both the shape and size of the feature, in addition to its sedimentary characteristics and biological composition. It's important that these	**<u>Water flow changes; Emergence regime changes</u>** **Option A:** Modelling results indicate that due to the presence of structures installed for the Proposed Development for Option A on a peak ebb and peak flood tide there could be a localised reduction in current speed of 0.05 to 0.1 m/s over a distance of 400 m (peak ebb tide) to 600 m (peak flood tide) with speed reductions of 0.1 to 0.2 m/s over a distance of 300 m (peak flood tide) to 400 m (peak ebb tide). **Option B:** For Option B (without the Ro-Ro pontoon) reductions in current speed were modelled to have a smaller footprint over a distance of 400 m on the peak ebb and flood tides and remained within the range 0.05 to 0.1 m/s with only small spots of speed reduction greater than 0.1 m/s seen close to White's Jetty (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). **Option C:** Dredging under Option C will change the natural tidal range on small sections of the intertidal zone and potentially affect water flow. The hydrodynamic assessment has indicated potential reductions in current speed of 0.05 to 0.2 m/s over a distance of 700 m on a peak ebb tide and			

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Wave exposure changes		hydrodynamic and sedimentary processes persist and are allowed to change in response to environmental conditions without hindrance. Hydrodynamic conditions include the speed and direction of wave and tidal currents, seabed shear stress and wave exposure (Little, 2000), (Elliott et al., 1998).	600 m on a peak flood tide. At the time of peak ebb tide the area of larger changes in currents which might have an effect on other estuary processes is restricted to the immediate area of the dredging, extending from the new passenger pontoon to White's Jetty. Within this area the modelling indicates some areas of speed reduction 0.2 m/s to 0.3 m /s. On a peak flood tide speed reductions of 0.05 to 0.2 m/s are modelled over a distance of 500 m, extending from the dredged area towards the north west of White's Jetty (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). **Option A, B and C:** For all options, on the ebb tide, small spots of speed increase are shown by the new breaches out of the habitat creation areas (see Proposed Development Design section above). This is likely due to the water flowing out of the habitat creation areas as they dry out (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4). Small spots of speed increase are also evident at the time of peak flood. However, as the time of peak flood is closer to high water when the habitat areas are flooded these small areas of increase are surrounded by areas of speed decrease. This is due to the interaction of the passing flow with that entering the habitat areas and the increased flow cross section area present when the habitat areas are inundated (ES Appendix 17.4: *Hydrodynamic and sedimentation assessment*, document ref: 6.2.17.4) and these effects are limited to the immediate area of the habitat areas. Potential indirect effects could be in relation to the changes in tidal flushing and sediment deposition/erosion changes and also tidal level changes. In the MarLIN MarESA the sensitivity of tentacled lagoon worm to these indirect effects is recorded as Low and resilience is High. Natural England's AoO lists the pressures 'water flow (tidal current) changes, including sediment transport considerations' and 'emergence regime changes, including			

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			tidal level change considerations' as medium-high risk and tentacled lagoon worm is indicated to be sensitive to these pressures (Table 6-2). Overall, however, these small changes in current speed are expected to have an insignificant effect on the tentacled lagoon worm feature.			

Chapter Eight ◆ In Combination Assessment

8.1 The identification of plans and projects to include in the in-combination assessment was based on consideration of any:

- approved plans;
- construction projects;
- approved but as yet unconstructed projects; and
- projects for which an application has been made, are currently under consideration and will be consented before the proposed works begin.

8.2 To identify the projects or plans local knowledge and the MMO Public Register were used. Four projects were identified within the local area of the Project Site which could have potential interactions with the marine construction works and operation for the Proposed Development including:

- Tilbury2 port development (NSIP ref: TR030003)
- Thurrock Flexible Generation Plant (NSIP ref: EN010092)
- The Pier, by Crest Nicholson (Dartford Borough Council, 17/01814/FUL)
- Purfleet Centre Regeneration (Thurrock Council, 17/01668/OUT)
- Tilbury Energy Centre

TILBURY 2 PORT DEVELOPMENT (NSIP REF: TR030003)

8.3 Tilbury2 is a proposed new port terminal to be located on land that formed the western part of the previous Tilbury Power Station site. It will be 820 m east of the Essex Project Site, and will have associated facilities for importing, exporting and processing a variety of goods. The main components of Tilbury2 will be:

- A Roll-On / Roll-Off (RoRo) terminal for importing and exporting containers and trailers which has now been constructed.
- A 'Construction Materials and Aggregates Terminal' (CMAT) for handling and processing bulk construction materials. This will be located at the northern part of the site.

8.4 Other parts of the site will be used for storage of bulk goods or vehicles (onshore).

8.5 A DCO application for Tilbury2 was submitted to the Planning Inspectorate (PINS) (on behalf of the Secretary of State for Communities and Local Government) and all associated supporting environmental reports have been published on the PINS website.

8.6 Consent was granted and the Tilbury2 scheme is now operational. It has been included within the Cumulative Assessment as the Ro-Ro facility only became operational in July 2020 and so the effects of this development are not considered to be included within the baseline.

8.7 The only overlapping pressure with the construction works and operation for the Proposed Development is maintenance dredging for Tilbury2. The Tilbury2 project will require regular maintenance dredging to allow access to the Ro-Ro facility. The MCZ assessment for Tilbury2 concluded that with dredging restricted to an ebb tide there would be no effect on the Swanscombe MCZ. Therefore the combination of pressures across Tilbury 2 and the Proposed Development (in particular in relation to increased sediment concentrations and smothering, which are of relevant to dredging activity) are considered to be negligible.

8.8 Consequently, in combination effects are assessed to be negligible and it is considered that the conservation objectives stated for the MCZ will not be hindered.

THURROCK FLEXIBLE GENERATION PLANT (NSIP REF: EN010092)

8.9 Thurrock Flexible Generation Plant is a flexible electricity generation plant on land next to Tilbury Substation in Thurrock. It will be 400 m east of the Essex Project Site. The main marine components of Thurrock Flexible Generation Plant will be the construction of a Ro-Ro causeway and capital dredging.

8.10 Construction is expected to start in 2021 for the majority of the Plant including the marine components. Construction is expected to take either 1-2 years or 3-6 years depending on the options chosen for the construction programme. It is then expected to operate for up to 35 years.

8.11 Any effects of capital dredging for this project would be minimal due to the distance of the project from the Swanscombe MCZ and would be associated with potential slight increases in suspended sediment levels or smothering to which tentacled lagoon worm has low sensitivity. Therefore the combination of pressures considered for Thurrock Flexible Generation Plant and the Proposed Development are considered to be negligible.

8.12 Consequently, in combination effects are assessed to be negligible and it is considered that the conservation objectives stated for the MCZ will not be hindered.

THE PIER, BY CREST NICHOLSON (DARTFORD BOROUGH COUNCIL, 17/01814/FUL)

8.13 The Pier Project is for the construction of a high-rise tower for mixed residential development together with adjacent launching jetty for small boats. It will be directly adjacent to the western boundary of the Kent Project Site. The boat jetty will require piling from a jack- up barge. However, construction for this site has not yet started so there is

the potential for an overlap in construction activities in relation to temporary disturbance. During operation, the main effect will be the movement of small boats to and from the jetty. The main potential effects of the Pier Project which could interact with the Kent Project Site for the Proposed Development are visual disturbance and increase in vessel activity. Tentacled lagoon worm is not sensitive to underwater noise and vibration or visual disturbance and in combination effects are assessed to be negligible. Therefore the combination of pressures considered for The Peir and the Proposed Development are considered to be negligible.

8.14 Due to the nature of potential effects, in combination effects are assessed to be negligible and it is considered that the conservation objectives stated for the MCZ will not be hindered.

PURFLEET CENTRE REGENERATION (THURROCK COUNCIL, 17/01668/OUT)

8.15 Purfleet Centre Regeneration will redevelop land on the north bank of the tidal River Thames in Purfleet city centre around 29 km west of the Proposed Development. The marine elements of this project are limited to replacement of parts of the river wall and flood defences (including piling) and the provision of surface water runoff outfalls. It is not clear when the piling for the river wall will be conducted for the Purfleet Centre Regeneration. The overall construction programme is from 2019 until 2034. However given the distance of the regeneration works it is anticipated that there would be no impact on features of the MCZ.

8.16 Due to the nature of potential effects and the distance of the works further upstream in combination effects are assessed to be negligible and it is considered that the conservation objectives stated for the MCZ will not be hindered.

TILBURY ENERGY CENTRE

8.17 The Tilbury Energy Centre is a proposed power station development project that would consist of a Combined Cycle Gas Power Station with a generating capacity up to 2500 megawatts (MW), Open Cycle Gas Turbines with a generating capacity up to 300MW and an energy storage facility. The Tilbury Energy Centre would be located approximately 6 km downstream of the Swanscombe MCZ. Works would include construction and operation of intakes and outfalls, piling for a jetty and dredging.

8.18 This proposal is currently on a Project Freeze with no proposed resumption date for the application.

8.19 In addition, due to its distance from the from the Swanscombe MCZ, any effects that could affect tentacled lagoon worm are considered to be minimal or negligible with increases in suspended sediment levels or smothering being the only pressures that could potentially interact between Tilbury Energy Centre and the Kent Project Site for the Proposed Development.

8.20 Consequently, in combination effects are assessed to be negligible and it is considered that the conservation objectives stated for the MCZ will not be hindered.

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Chapter Nine ◆ Summary and Conclusions

9.1 An assessment has been undertaken of the potential effects of the London Resort on the maintenance of favourable condition of the features of the Swanscombe MCZ.

9.2 The main potential effects on these features that were considered were based on Advice on Operations (AoO) from Natural England. These potential effects were:

- Abrasion/ disturbance
- Changed in suspended sediments
- Emergence regime changes
- Habitat structure changes
- Penetration and/or disturbance of substratum below surface of seabed
- Physical change (to another seabed type)
- Physical change (to another sediment type)
- Physical loss (to land or freshwater habitat)
- Removal of non-target species
- Smothering and siltation rate change
- Water flow changes
- Wave exposure changes

9.3 For the MCZ feature intertidal mud it was considered unlikely that the Proposed Development would hinder the achievement of the conservation objectives stated for the MCZ for Option A, B and C.

9.4 The potential area of combined intertidal and subtidal sediment lost permanently or disturbed for Options A and B is an order of magnitude less than for Option C (primarily due to the dredging that would be required for Option C). Consequently, for the MCZ feature tentacled lagoon worm it was considered that with Options A and B there would be lower risk of hindering the achievement of the conservation objectives stated for the MCZ than with Option C. This view has been agreed with NE, however, NE has advised that Stage 2 assessment will likely be required for Option A and B for tentacled lagoon worm, in particular in relation to loss of habitat and habitat disturbance.

9.5 Discussion will be held with NE to determine options to minimise potential effects of the Proposed Development on the MCZ features if either Option A or B is taken forward.

9.6 Under option C, there is a potential risk that achievement of conservation objectives could potentially be hindered in terms of the loss/disturbance of intertidal and subtidal habitat for the feature tentacled lagoon worm. With this being the case, according to section 126(7)(a) for the MCAA, it would be necessary that the developer satisfies the authority of some stated conditions including 'there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of those objectives'. Consequently, only if it is determined that Option A and B are not feasible then Option C would be pursued and a Stage 2 assessment would be required for Option C.

9.7 In combination effects with other projects were also considered. Five projects were considered (Tilbury2 port terminal; Thurrock Flexible Generation Plant; The Pier, by Crest Nicholson; Purfleet Centre Regeneration; and the Tilbury Energy Centre). It was concluded that no in combination impacts were expected that would change the outcome of the assessment.

Chapter Ten ◆ Consultation Responses

10.1 Consultation on the Preliminary Environmental Impact Assessment (PEIR) in 2020 included comments made by Natural England and the SoS on the MCZ process (see table below).

10.2 In addition NE provided comments on a draft of this MCZ assessment which was submitted for review. Comments were received on 10/12/2020 (Ref: DAS 6848) and have been considered/addressed within this current draft.

Inspectorate's comments	EDP/APEM Response
Natural England has significant concerns regarding the direct and indirect impacts that are likely to result to the Swanscombe Marine Conservation Zone (MCZ) and these need to be more fully explored within the environmental statement. We would expect the Resort to avoid impacts wherever possible.	Noted. Both the direct and indirect impacts are fully assessed within the MCZ assessment. Three options are proposed for the design of the marine infrastructure elements and each has been assessed. It has been determined that option C will only be pursued where option A or B are not feasible to avoid significant impacts on the MCZ.
The proposed works, as detailed within the PEIR, are sited within the Swanscombe MCZ. The Swanscombe MCZ was designated in May 2019 due to its population of tentacled lagoon worm (*Alkmaria romijni*) and intertidal mud habitat. Tentacled lagoon worm is known to be found in lower intertidal and shallow subtidal muddy sediments, which may include muddy pockets within coarser sediment types. MCZ sites are designated and managed in accordance with the Marine and Coastal Access Act 2009. It is stated throughout the Marine Ecology Chapter of the PEIR that potential effects to the MCZ will be detailed within an MCZ assessment, conducted at the DCO stage. Natural England advises that consideration should be given to the MCZ assessment as soon as possible, in order to ensure that there is sufficient evidence and assessment to understand impacts to the site. Delaying the MCZ assessment until the DCO stage is likely to pose a consenting risk. We would be happy to engage on the MCZ assessment during the pre-	Noted and NE have been consulted on MCZ assessment.

application period to try and find a solution where impacts are likely to occur.	
From the information provided, Natural England has concerns about impacts to the site. Whilst we cannot predetermine the outcome of an MCZ assessment, due to the size and location of the project footprint it is advised that the applicant familiarise themselves with the requirements of the legislation, including the legal process that follows when it cannot be concluded that a development proposal will not hinder the conservation objectives of an MCZ. In this scenario further considerations must take place including alternatives to the current proposal; public benefit tests; and the requirement to implement measures of equivalent environmental benefit.	Noted.
It is important to note that the criteria for a MCZ assessment is different to that of the Environmental Impact Assessment (EIA). For example, an EIA may consider potential impacts on the tentacled lagoon worm and habitat on a Thames Estuary scale, however the MCZ assessment must focus on the distribution, extent and condition of habitats and tentacled lagoon worm populations within the Swanscombe MCZ boundary. This is on a much finer scale than for the whole of the Thames Estuary. Known information on the distribution of designated features can be found on MAGIC.	Noted. The criteria for MCZ assessments has been outlined in this document. The distribution, extent and condition of habitats and tentacle lagoon worm populations have been noted and considered within the MCZ assessment. The MAGIC maps resource was used to inform the distribution assessment.
Currently there is no published conservation advice that is specifically for the Swanscombe MCZ. Natural England therefore advise that the Conservation Advice package for the Medway Estuary MCZ7 is used to aid assessment of TLW. In addition, the Medway Estuary & Marshes SPA8 conservation advice package has information within the 'Advice on Operations' section that will be useful for understanding pressures and sensitivities associated with intertidal mud in the southeast region, which will be applicable for Swanscombe. The package for The Dart Estuary MCZ will contain further information	Noted. The pressures assessed in the MCZ assessment are based on proxy AoO from Natural England for 'Ports and Harbours (Construction activities)' for the tentacled lagoon worm feature from the Medway Estuary MCZ advice package (the nearest appropriate MCZ), and for the intertidal mud feature the assessment has been based on information in the Medway Estuary and Marshes SPA (conservation advice package and AoO). The Dart Estuary MCZ (supplementary advice) was also considered but did not appear to add anything additional to the Medway Estuary packages.

on attributes for intertidal mud in the 'Supplementary Advice' section. Although some of the information in these packages is area/site specific, they will provide information which is important for understanding how to assess and maintain feature condition.	
Natural England has concerns about the permanent loss of intertidal mud as a result of construction of the ferry terminal and roll on, roll off slipway, and the extension of Bell Wharf. Intertidal mud is a feature of the Swanscombe MCZ, as well as supporting habitat for the tentacle lagoon worm. In addition, there would be a permanent loss of subtidal mud and other sediment habitats that may support tentacled lagoon worm as a result of the proposed construction of the passenger jetty. The footprint of the development does overlap with a known hotspot for the presence of the tentacled lagoon worm within the site. The full extent of any habitat loss and the functional importance of lost habitat for the form and function of the site must be assessed within the environmental statement.	The loss of habitat has been assessed in this MCZ assessment and within the ES Chapter 13: Marine Ecology and Biodiversity
It is noted that dredging is not currently considered to be required for construction and the PEIR assumes that dredging will not be conducted. Natural England advises that evidence should be provided to support this assumption, as any dredging requirements within the Swanscombe MCZ would be subject to further designated site assessment. Potential pressures exerted from dredging would include habitat structure changes (i.e. extraction), penetration and abrasion of sediment habitats.	Noted. The potential requirement for dredging is now included within the MCZ assessment (potentially required for Option C only). The pressures associated with dredging have been considered.
Tentacled lagoon worm have specific habitat requirements (including, for example, salinity, sediment composition, levels of exposure) with a preference for sheltered, low energy environments and are sensitive to disturbance from boat wash. Therefore, Natural England advise that there is a potential for persistent impacts on the tentacles lagoon worm, as a	Noted. Potential persistent impacts to the tentacled lagoon worm caused by operational activities such as vessel movement and docking have been assessed within this MCZ assessment, along with potential impacts of these activities on intertidal mud.

result of regular vessel movement within the MCZ and vessel docking procedures during the operational phase of the project. There may be additional impacts to the intertidal mud feature too. The impact of the operational phase of the jetty and vessels must therefore be fully assessed.	
It is noted that the proposal for a wastewater treatment facility has not been considered further on the basis that water discharged would meet any water quality criteria required for consent. However, Natural England advises that consideration should be given to habitat loss/disturbance as a result of scour caused by discharged water from the outfall into the MCZ. We would also recommend further information is provided on the details of any construction works required for this facility, including the outfall. All direct and indirect impacts must be assessed fully within the environmental statement.	Noted. Potential for scour at the discharge point has been considered in the MCZ assessment.
The PEIR provides details of some schemes for habitat creation, most notably saltmarsh creation around the peninsula. If this takes place within or adjacent to the MCZ then impacts to the designated features must be assessed, including any direct loss of MCZ features. It is possible that the creation of habitats within or in close proximity to the site, such as saltmarsh, may not be compatible with the conservation objectives of the MCZ. As such, further clarity is required and Natural England would welcome the opportunity to discuss this further in the coming weeks.	NE were made aware of this information.
It is stated in the PEIR that species such as tentacled lagoon worm may be disturbed or displaced and some individuals may be subject to injury/mortality as a result of construction activities. However the number of individuals affected are considered to be negligible in relation to the wider population. As detailed above, the MCZ assessment must consider the conservation objectives for the population of tentacles lagoon within the site boundary. The development footprint, particularly the passenger ferry berth, overlaps with a known	Noted, the MCZ assessment has considered the conservation objectives for the population of tentacles lagoon worms within the site boundary.

concentration of tentacled lagoon worm records within the DCO boundary. Therefore, a detailed assessment of impacts arising from the project, for the full lifetime for the project, must be carried out.	
Likewise for intertidal mud, there must be a detailed site specific assessment for the Swanscombe MCZ. As well as potential loss of habitat, disturbance may affect the communities/biotopes that live within the sediment. The functional importance of lost or altered biotopes needs to be considered in the assessment.	Noted, the functional importance of lost or altered biotopes has been considered in the MCZ assessment.
Natural England notes that marine ecology surveys, including intertidal and subtidal habitat surveys, are planned for 2020 to inform the Environmental Statement, which is to be submitted at the DCO application stage. We would welcome the opportunity to discuss these further to ensure that the baseline data collected is suitable for the MCZ assessment where required.	Noted. Intertidal and subtidal marine ecology surveys have been completed in 2020. Survey reports have been provided to NE along with the MCZ assessment.

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References

Ashley, M. & Budd, G.C., 2020a. [Hediste diversicolor] and [Corophium volutator] in littoral mud. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 23-11-2020]. Available from: https://www.marlin.ac.uk/habitats/detail/1200

Ashley, M. & Budd, G.C., 2020b. [Hediste diversicolor] and [Streblospio shrubsolii] in littoral sandy mud. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 23-11-2020]. Available from: https://www.marlin.ac.uk/habitats/detail/132

Defra. 2010. Guidance on the duties on public authorities in relation to Marine Conservation Zones (Note 2) Guidance on the duties which will be placed on public authorities in relation to Marine Conservation Zones under Part 5 of the Marine and Coastal Access Act 2009

Defra. 2013. Implementing the Marine Strategy Framework Directive.

Defra. 2019. Swanscombe MCZ Feature Map. https://www.gov.uk/government/publications/marine-conservation-zones-swanscombe

Elliott, M., Nedwell, S., Jones, N.V., Read, S.J., Cutts, N.D. and Hemingway, K.L. (1998). Intertidal sand and mudflats and subtidal mobile sandbanks volume II. An overview of dynamic and sensitivity characteristics for conservation management of marine SACs. UK Marine SACs Project. Oban, Scotland, English Nature.

Gray, J.S., Elliott, M. 2009. Ecology of Marine Sediments: From Science to Management. Oxford University Press.

Joint Nature Conservation Committee. 2011. Advice on the impacts of MCZs on information provision and decisions in relation to marine licensing proposals

Joint Nature Conservation Committee (JNCC) (2004). Common standards monitoring

guidance for littoral rock and inshore sublittoral rock habitats [online]. Available at:

https://hub.jncc.gov.uk/assets/9b4bff32-b2b1-4059-aa00-bb57d747db23#CSM-LittoralSublittoralRock-2004.pdf [Accessed 06 August 2020].

Little, C. (2000). The biology of soft shores and estuaries, Oxford University Press.

Marine Management Organisation (MMO). 2013. Marine Conservation Zones and marine licensing.

Natural England. 2014. Marine Conservation Zones. Natural England's advice to Defra on recommended Marine Conservation Zones to be considered for consultation in 2015.

Tyler-Walters, H. & White, N. 2017. Alkmaria romijni Tentacled lagoon worm. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 09-10-2020]. Available from: https://www.marlin.ac.uk/species/detail/1200.

Appendix

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Appendix 1.0 Figures

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Figure 13.8.1: London Resort Project Site in relation to the Swanscombe MCZ.

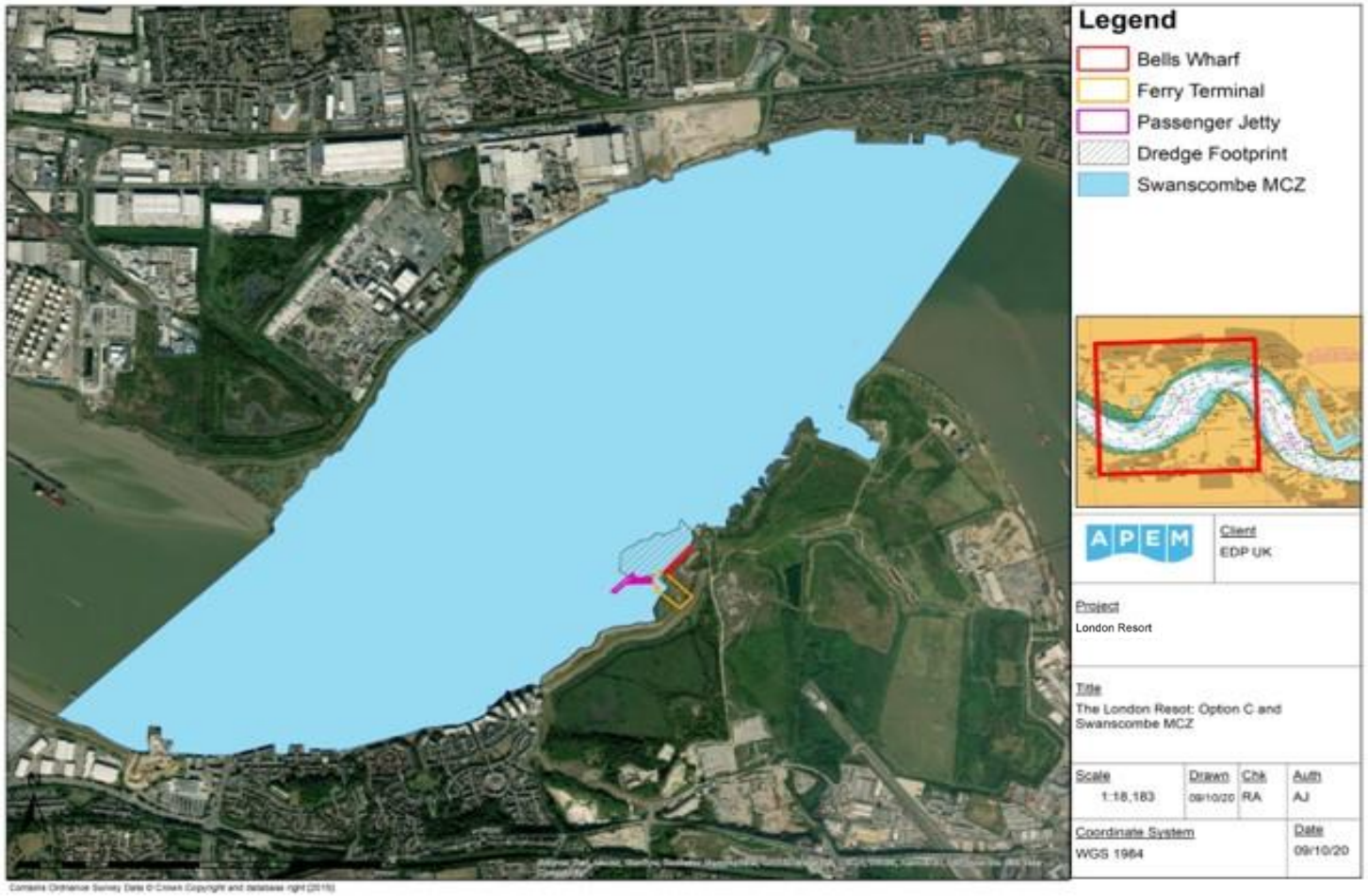


Figure 13.8.2: Option A design at the Kent Project Site

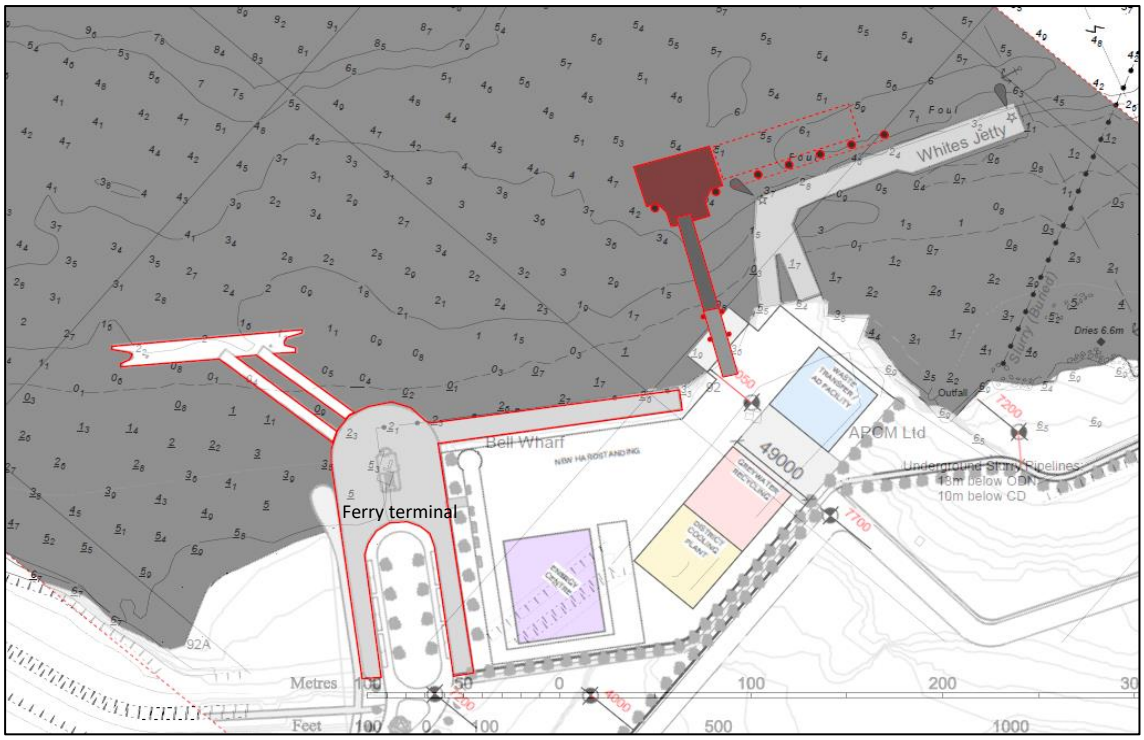


Figure 13.8.3: Option B design at the Kent Project Site

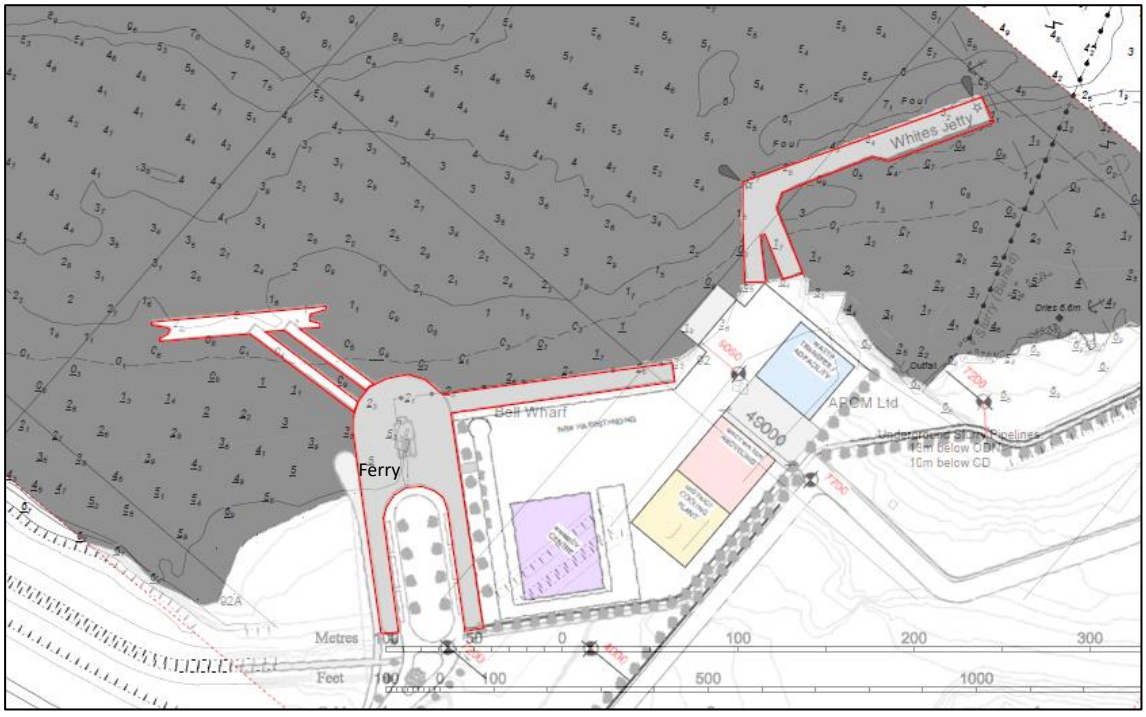


Figure 13.8.4: Option C design at the Kent Project Site

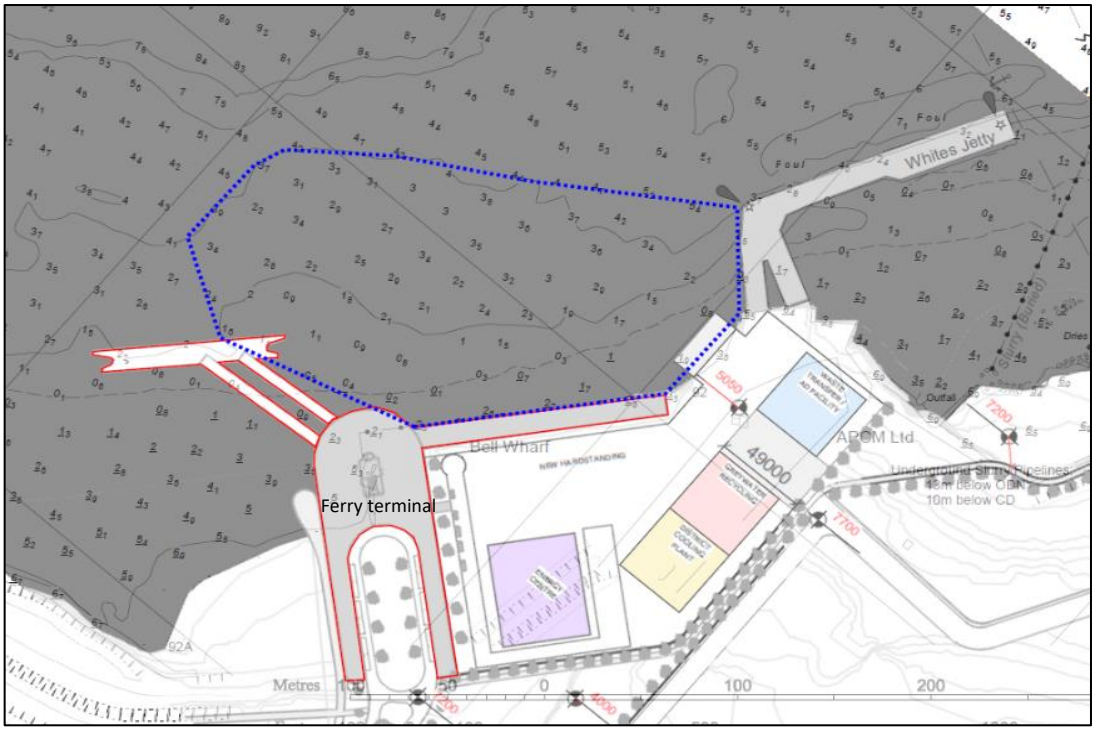


Figure 13.8.5: Design of proposed ferry pontoon at the Essex Project Site

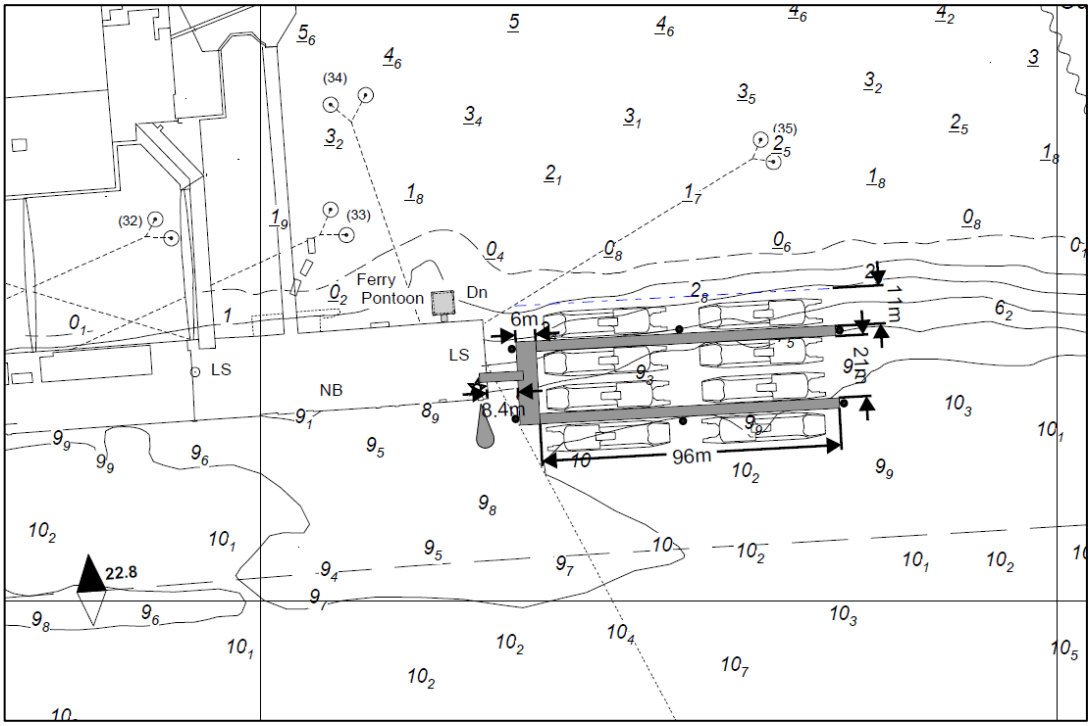


Figure 13.8.6: Intertidal mud locations within the Swanscombe Estuary MCZ and target sampling locations (from Defra 2019)

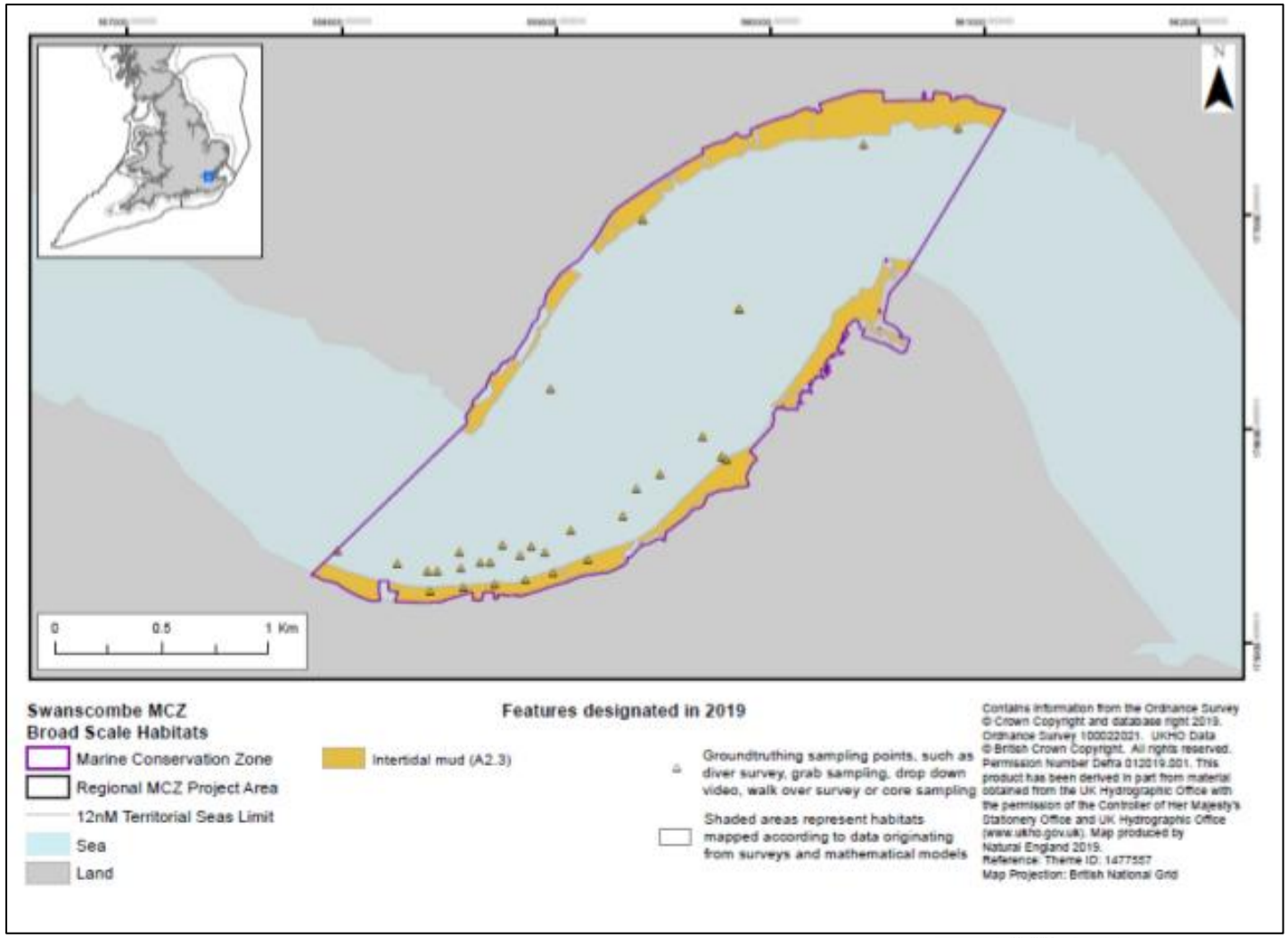
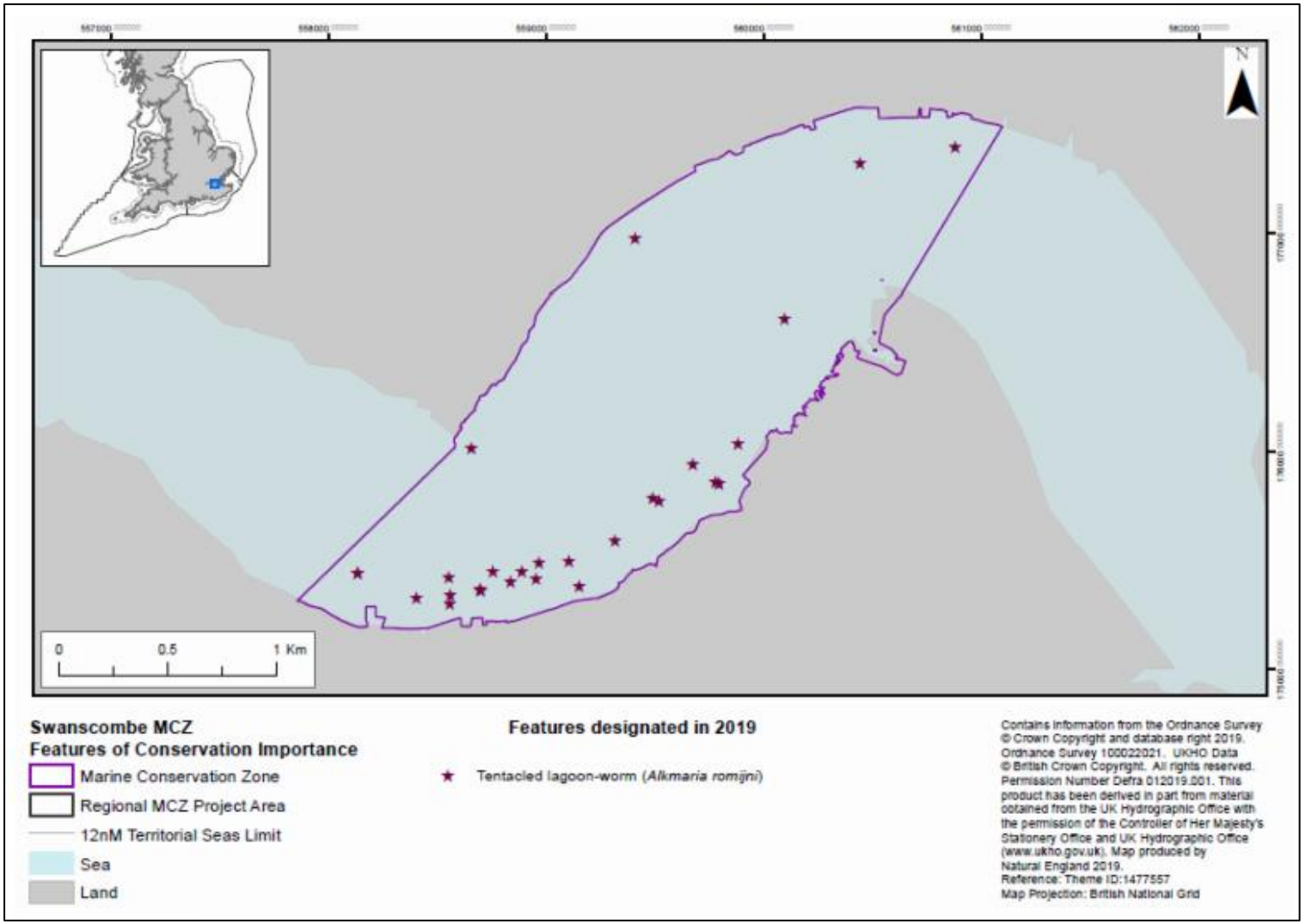


Figure 13.8.7: Tentacled lagoon worm feature locations within Swanscombe Estuary MCZ (from Defra 2019). Stars = tentacled lagoon worm indicated as being present.



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