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ESTUARIES

OFFSHORE WIND FARM

FIVE ESTUARIES

OFFSHORE WIND FARM

PRELIMINARY ENVIRONMENTAL
INFORMATION REPORT

VOLUME 2, CHAPTER 12

INFRASTRUCTURE AND OTHER MARINE
USERS

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DEFINITION OF ACRONYMS

Term	Definition
AtoN	Aids to Navigation
BEIS	Department for Business, Energy and Industrial Strategy
CCS	Carbon Capture and Storage sites
Defra	Department for Environment, Food, and Rural Affairs
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ES	Environmental Statement
I&OMU	Infrastructure and Other Marine Users
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IPC	Infrastructure Planning Commission
LSE	Likely Significant Effect
MCA	Maritime and Coastguard Agency
MDS	Maximum Design Scenario
MGN	Marine Guidance Note
MMO	Marine Management Organisation
MoD	Ministry of Defence
Nm	Nautical mile
NtM	Notice to Mariners
O&M	Operations and Maintenance
OREI	Offshore Renewable Energy Installations
OSP	Offshore Substation Generator
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Area
PINS	Planning Inspectorate
RLB	Red Line Boundary
SoS	Secretary of State



Term	Definition
SSC	Suspended Sediment Concentration
STEE	Spring Tidal Excursion Ellipse
TMP	Traffic Management Plan
UKCS	United Kingdom Continental Shelf
UXO	Unexploded Ordnance
VE	Five Estuaries Offshore Wind Farm
VE OWFL	Five Estuaries Offshore Wind Farm Limited
WTG	Wind Turbine Generator
ZoI	Zone of Influence



GLOSSARY OF TERMS

Term	Definition
Array areas	The areas where the wind turbines will be located.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact in question with the sensitivity of the receptor in question, in accordance with defined significance criteria.
Export Cable Corridor (ECC)	The area(s) where the export cables will be located.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial, resulting from the activities associated with the construction, operation and maintenance, or decommissioning of the project.
Maximum Design Scenario (MDS)	The maximum design parameters of the combined project assets that result in the greatest potential for change in relation to each impact assessed.
Mitigation	Mitigation measures, or commitments, are commitments made by the project to reduce and/or eliminate the potential for significant effects to arise as a result of the project. Mitigation measures can be embedded (part of the project design) or secondarily added to reduce impacts in the case of potentially significant effects.
Preliminary Environmental Information Report (PEIR)	Preliminary Environmental Information Report. The PEIR is written in the style of a draft Environmental Statement (ES) and forms the basis of statutory consultation. Following that consultation, the PEIR documentation will be updated into the final ES that will accompany the application for the Development Consent Order (DCO).
Red Line Boundary (RLB)	The extent of development including all works, access routes, TCCs, visibility splays and discharge points. At ES the Red Line Boundary will become 'the proposed Order Limits'.



12 INFRASTRUCTURE AND OTHER MARINE USERS

12.1 INTRODUCTION

12.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary results of the assessment of the likely significant effects of Five Estuaries Offshore Wind Farm (VE) with respect to Infrastructure and Other Marine Users (I&OMU) during the construction, Operations and Maintenance (O&M) and decommissioning phases that are not covered by other topic-specific chapters.

12.1.2 This chapter should be read in conjunction with the following PEIR chapters:

- > Volume 2, Chapter 8: Commercial Fisheries;
- > Volume 2, Chapter 9: Shipping and Navigation;
- > Volume 2, Chapter 13: Military and Civil Aviation; and
- > Volume 3, Chapter 3: Socio-Economic, Tourism and Recreation.

12.1.3 Other marine users considered in this chapter include:

- > Offshore renewables;
- > Oil and gas;
- > Nuclear energy facilities;
- > Carbon capture and storage (CCS);
- > Cables and pipelines;
- > Aggregate sites;
- > Marine disposal sites;
- > Military areas (note that military is also covered in Volume 2, Chapter 13: Military and Civil Aviation) and;
- > Marine structures.

12.1.4 Marine and coastal recreational activities and water sports have not been considered within this chapter, and are instead covered within Volume 2, Chapter 9: Shipping and Navigation and Volume 3, Chapter 3: Socioeconomics, Tourism and Recreation.

12.2 STATUTORY AND POLICY CONTEXT

12.2.1 This section identifies the legislation, policy and other documentation that has informed the assessment of effects with respect to I&OMU. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Volume 1, Chapter 2: Policy and Legislation.

12.2.2 The Planning Act 2008, the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and the Environment Act (1995) are considered along with the legislation of specific relevance to I&OMU as identified within Table 12.1.



Table 12.1: Legislation and policy context.

LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
Legislation		
United Nations Convention on the Law of the Sea (UNCLOS) – Article 79: Submarine cables and pipelines on the continental shelf.	This article protects submarine cables and requires Five Estuaries Offshore Wind Farm Limited (VE OWFL) to have due regard for any existing cables or pipelines in position and not prejudice the possibilities of repair.	Submarine cables and pipelines are considered within the existing environment in Paragraph 12.7.2 <i>et seq.</i> (with reference to Figure 12.3) and are considered within the preliminary assessment (Section 12.10, Section 12.11, and Section 12.12) throughout the construction, operation and decommissioning phases of VE.
UNCLOS – Article 113: high sea areas.	This article states that if an existing submarine or power cable is broken or injured, this will be a punishable offence. If a cable or pipeline is broken during the laying or repairing of another cable, VE OWFL will be subject to pay the repair costs.	
The Submarine Telegraph Act (1885).	This act protects submarine telegraph cables.	
Energy Act (2004).	This act sets out the basic requirements for applying a safety zone to be placed around or adjacent to an Offshore Renewable Energy Installation (OREI).	Safety zones are included in the environmental measures in Table 12.13.
The Electricity (Offshore Generating Stations) (Safety Zones) (Applications Procedures and Control of Access) Regulations (2007).	Applications for safety zones must be made to the relevant regulatory authority. In this case, it will be the Department for Business, Energy, and Industrial Strategy (BEIS), however, where the Marine Management Organisation (MMO) has granted a Section 36 consent (under the Electricity Act 1989) for projects in the sea off England and Wales, the MMO will be the relevant regulatory authority.	Safety zones are included in the environmental measures in Table 12.13.
Policy		



LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
<p>Overarching National Policy Statement (NPS) for Energy (EN-1) (DECC, 2011a).</p>	<p>Sets out the Government’s policy for major energy infrastructure.</p>	
	<p>EN-1, Paragraph 5.4.10: Where the proposed development may have an effect on civil or military aviation and/or other defence assets an assessment of potential effects should be set out in the ES.</p>	<p>MoD activities (including danger areas) are identified within the existing environment section of this chapter (Paragraph 12.7.14 <i>et seq.</i>). The impact of marine developments on military activities due to the presence of danger and exercise areas located across the UK Continental Shelf (UKCS) are considered within Section 12.10, Section 12.11, and Section 12.12.</p>
	<p>EN-1, Paragraph 5.4.11: VE OWFL should consult the Ministry of Defence (MoD), Civil Aviation Authority (CAA), National Air Traffic Services (NATS) and any aerodrome – licensed or otherwise – likely to be affected by the proposed development in preparing an assessment of the proposal on aviation or other defence interests.</p>	<p>This chapter (Section 12.10, Section 12.11, and Section 12.12) identifies where likely significant effects have been determined and where mitigation is proposed and/ or consultation with the MoD will be undertaken to (as noted above) seek agreement on appropriate controls.</p>
<p>Draft revised NPS EN-1 (BEIS, 2021a).</p>	<p>Draft revised NPS EN-1, Paragraph 5.5.10: Where the proposed development may have an effect on civil or military aviation and/or other defence assets an assessment of potential effects should be set out in the ES.</p>	<p>MoD activities (including danger areas) are identified within the existing environment section of this chapter (Paragraph 12.7.14 <i>et seq.</i>). The impact of marine developments on military areas are considered within Section 12.10, Section 12.11, and Section 12.12.</p>
	<p>Draft revised NPS EN-1, Paragraph 5.5.11: VE OWFL should consult the MoD, CAA, NATS and any aerodrome – licensed or otherwise – likely to be affected by the proposed development in preparing an</p>	<p>This chapter (Section 12.10, Section 12.11, and Section 12.12) identifies where likely significant effects have been determined and where mitigation is proposed and/ or consultation with the MoD will be undertaken</p>



LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	assessment of the proposal on aviation or other defence interests	to seek agreement on appropriate controls.
NPS for Renewable Energy (EN-3) (DECC, 2011b).	Sets out guidance and requirements for nationally significant energy infrastructure projects.	
	EN-3, Paragraph 2.6.35: There may be constraints imposed on the siting or design of offshore wind farms because of restrictions resulting from the presence of other offshore infrastructure or activities.	Site selection is addressed in Volume 1, Chapter 4: Site Selection Alternatives.
	EN-3, Paragraph 2.6.179: Where a potential offshore wind farm is proposed close to existing operational offshore infrastructure or has the potential to affect activities for which a licence has been issued by Government, VE OWFL should undertake an assessment of the potential effect of the proposed development on such existing infrastructure or activities. The assessment should be undertaken for all stages of the lifespan of the proposed wind farm in accordance with the appropriate policy for offshore wind farm EIAs.	Consideration of other plans, projects and activities throughout the lifetime of VE is made throughout this chapter. Existing offshore infrastructure is considered within Section 12.10, Section 12.11, and Section 12.12 of this preliminary assessment.
	EN-3, Paragraph 2.6.180: Applicants should engage with interested parties in the potentially affected offshore sectors early in the development phase of the proposed offshore wind farm, with an aim to resolve as many issues as possible prior to the submission of an application to the Infrastructure Planning Commission (IPC).	VE OWFL have undertaken a thorough pre-application consultation process which has been used to inform the PEIR. Section 12.3 provides details of the relevant OMU consultation.
	EN-3, Paragraph 2.6.184: As such, the IPC should be satisfied	Site selection is addressed in Volume 1, Chapter 4: Site



LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	<p>that the site selection and site design of the proposed offshore wind farm has been made with a view to avoiding or minimising disruption or economic loss or any adverse effect on safety to other offshore industries. The IPC should not consent applications which pose unacceptable risks to safety after mitigation measures have been considered.</p>	<p>Selection and Alternatives and economic impacts are considered in Volume 3, Chapter 3: Socio-Economic, Tourism and Recreation. The Red Line Boundary (RLB) has been refined since scoping in order to minimise, as far as practicable, disruption to existing infrastructure and other users. This preliminary assessment (Section 12.10, Section 12.11, and Section 12.12) identifies where likely significant effects have been determined and where mitigation and/ or consultation with third-parties is proposed in order to seek appropriate controls in order to reduce potential effects to acceptable levels.</p>
	<p>EN-3, Paragraph 2.6.187: Detailed discussions between VE OWFL for the offshore wind farm and the relevant consultees should have progressed as far as reasonably possible prior to the submission of an application to the IPC. As such, appropriate mitigation should be included in any application to the IPC, and ideally agreed between the relevant parties.</p>	<p>VE OWFL have undertaken consultation with a number of stakeholders, which is detailed in Section 12.3. Where there is potential for significant effects on I&OMU, following PEIR consultation, VE OWFL will continue to consult with the relevant parties to (as noted above) seek agreement on appropriate controls.</p>
<p>Draft revised NPS for Renewable Energy Infrastructure EN-3 (BEIS, 2021b).</p>	<p>Draft revised NPS EN-3, Paragraph 2.22.19: There may be constraints imposed on the siting or design of offshore wind farms because of the presence of other offshore infrastructure or activities.</p>	<p>Site selection is addressed in Volume 1, Chapter 4: Site Selection and Alternatives.</p>
	<p>Draft revised NPS EN-3, Paragraph 2.34.4: Where a potential offshore wind farm is proposed close to existing</p>	<p>Consideration of other plans, projects and activities throughout the lifetime of VE is made throughout this chapter. Existing</p>



LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	<p>operational offshore infrastructure or has the potential to affect activities for which a licence has been issued by government, VE OWFL should undertake an assessment of the potential effects of the proposed development on such existing or permitted infrastructure or activities. The assessment should be undertaken for all stages of the lifespan of the proposed wind farm in accordance with the appropriate policy and guidance for offshore wind farm EIAs. Marine plans (paragraph 2.22.5 of this NPS and Section 4.4 of EN-1) will help applicants consider which activities may be most affected by their proposal and thus where to target their assessment.</p>	<p>offshore infrastructure is considered within Section 12.10, Section 12.11, and Section 12.12 of this preliminary assessment.</p>
	<p>Draft revised NPS EN-3, Paragraph 2.34.5: Applicants should engage with interested parties in the potentially affected offshore sectors early in the development planning phase of the proposed offshore wind farm, with an aim to resolve as many issues as possible prior to the submission of an application.</p>	<p>VE OWFL have undertaken a thorough pre-application consultation process which has been used to inform the PEIR. Section 12.3 provides details of the relevant OMU consultation.</p>
	<p>Draft revised NPS EN-3, Paragraph 2.34.7: Detailed discussions between VE OWFL for the offshore wind farm and the relevant consultees should have progressed as far as reasonably possible prior to the submission of an application. As such, appropriate mitigation should be included in any application, and ideally agreed between relevant parties.</p>	<p>VE OWFL have undertaken consultation with a number of stakeholders, which is detailed in Section 12.3. Where there is potential for significant effects on I&OMU, following PEIR consultation, VE OWFL will continue to consult with the relevant parties to (as noted above) seek agreement on appropriate controls.</p>



LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	<p>Draft revised NPS EN-3, Paragraph 2.34.11: As such, the Secretary of State should be satisfied that the site selection and site design of the proposed offshore wind farm has been made with a view to avoiding or minimising disruption or economic loss or any adverse effect on safety to other offshore industries. Applicants will be required to demonstrate that risks to safety will be reduced to as low as reasonably practicable. The Secretary of State should not consent applications which pose unacceptable risks to safety after mitigation measures have been considered.</p>	<p>Site selection is addressed in Volume 1, Chapter 4: Site Selection and Alternatives and economic impacts are considered in Volume 3, Chapter 3: Socio-Economic, Tourism and Recreation. The RLB has been refined since scoping in order to minimise, as far as practicable, disruption to existing infrastructure and other users. This preliminary assessment (Section 12.10, Section 12.11, and Section 12.12) identifies where likely significant effects have been determined and where mitigation and/ or consultation with third-parties is proposed in order to seek appropriate controls in order to reduce potential effects to acceptable levels.</p>
<p>UK Marine Policy Statement (MPS).</p>	<p>The MPS is the framework for preparing Marine Plans and taking decisions affecting the marine environment. It contributes to the achievement of sustainable development in the United Kingdom marine area. It was prepared and adopted for the purpose of Section 44 of the Marine and Coastal Access Act 2009.</p> <p>UK MPS, Section 3.2.9: The construction and operation of offshore marine infrastructure, as well as policies on conservation designations and the health of the wider environment may impact on defence interests in certain areas. Marine plan authorities and decision makers should take full account of the individual and cumulative effects of marine</p>	<p>MoD activities (including danger areas) are identified within the existing environment section of this chapter (Paragraph 12.7.14 <i>et seq.</i>). This chapter (Section 12.10, Section 12.11, and Section 12.12) identifies where likely significant effects have been determined and where mitigation is proposed and/ or consultation with the MoD will be undertaken to (as noted above) seek agreement on appropriate controls.</p> <p>Further information is provided in Volume 2, Chapter 9: Shipping and Navigation and Volume 2, Chapter 13: Military and Civil Aviation.</p>



LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	<p>infrastructure on both marine and land-based MoD interests. Marine plan authorities, decision makers and developers should consult the MoD in all circumstances to verify whether defence interests will be affected.</p>	
<p>East Marine Plans (EMP) (Department for Environment, Food and Rural Affairs (DEFRA), 2014).</p>	<p>EMP, AGG1: Proposals in areas where a licence for extraction of aggregates has been granted or formally applied for should not be authorised unless there are exceptional circumstances.</p>	<p>Marine aggregate sites have been identified within the existing environment section of this chapter (Paragraph 12.7.11 <i>et seq.</i>).</p>
	<p>EMP, AGG3: Within defined areas of high potential aggregate resources, proposals should demonstrate in order of preference:</p> <ul style="list-style-type: none"> a) that they will not prevent aggregate extraction; b) how, if there are adverse impacts on aggregate extraction, they will minimise these; c) how, if the adverse impacts cannot be minimised, they will be mitigated; d) the case for proceeding with the application if it is not possible to minimise or mitigate the adverse impacts. 	<p>Marine aggregate sites have been identified within the existing environment section of this chapter (Paragraph 12.7.11 <i>et seq.</i>). Section 12.10, Section 12.11, and Section 12.12 identifies where likely significant effects have been determined and where mitigation is proposed.</p>
	<p>EMP, DD1: Proposals within or adjacent to licensed dredging and disposal areas should demonstrate, in order of preference:</p> <ul style="list-style-type: none"> a) that they will not adversely impact dredging and disposal activities; b) how, if there are adverse impacts on dredging and 	<p>Marine dredging and disposal sites have been identified within the existing environment section of this chapter (Paragraph 12.7.9 <i>et seq.</i>). Section 12.10, Section 12.11, and Section 12.12 identifies where likely significant effects have been determined and where mitigation is proposed.</p>



LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
	<p>disposal, they will minimise these;</p> <p>c) how, if the adverse impacts cannot be minimised they will be mitigated;</p> <p>d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the proposed impacts.</p>	
	<p>EMP, DEF1: Proposals in or affecting MoD Danger and Exercise Areas should not be authorised without agreement from the MoD.</p>	<p>MoD activities (including danger areas) are identified within the existing environment section of this chapter (Paragraph 12.7.14 <i>et seq.</i>). This chapter (Section 12.10, Section 12.11, and Section 12.12) identifies where likely significant effects have been determined and where mitigation is proposed and/ or consultation with the MoD will be undertaken to (as noted above) seek agreement on appropriate controls.</p>
<p>Other documentation</p>		
<p>Maritime and Coastguard Agency (MCA) Marine Guidance Note (MGN) 654 (MCA, 2016).</p>	<p>Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response. This guidance highlights issues to be taken into consideration when assessing the impact on navigational safety and emergency response caused by OREI developments. It includes guidance on marine cable protection and burial within UK waters. Should water depths be reduced by more than 5% (due to cable protection) of Chart Datum then further consultation would be required.</p>	<p>This chapter (Section 12.10, Section 12.11, and Section 12.12) identifies where likely significant effects have been determined, including issues that may impact navigational safety. Details of embedded mitigation, including the use of a Traffic Management Plan (TMP), are provided in Table 12.13.</p> <p>A full navigational safety assessment is provided in Volume 2, Chapter 9: Shipping and Navigation.</p>



LEGISLATION/ POLICY	KEY PROVISIONS	SECTION WHERE COMMENT ADDRESSED
<p>International Association of Marine Aids to Navigation (AtoN) and Lighthouse Authorities (IALA), Recommendation O-139 on the marking of man-made offshore structures, Edition 2 (IALA, 2013).</p>	<p>These recommendations apply to all offshore structures and/or platforms and make specific reference to Offshore Wind Farms (OWFs) and are required for safe navigation, protection of the environment and protection of the structures themselves.</p>	<p>This PEIR (Section 12.10, Section 12.11, and Section 12.12) identifies where likely significant effects have been determined, including issues that may impact navigational safety. Details of embedded mitigation, including lighting and marking design, are provided in Table 12.13.</p> <p>A full navigational safety assessment is provided in Volume 2, Chapter 9: Shipping and Navigation and project design features are outlined in Volume 2, Chapter 1: Offshore Project Description.</p>



12.3 CONSULTATION

- 12.3.1 VE OWFL submitted a Scoping Report and request for a Scoping Opinion to the Secretary of State (SoS) (administered by the Planning Inspectorate (PINS)) in October 2021. A Scoping Opinion was received in November 2021. The Scoping Report set out the proposed assessment methodologies for I&OMU, an outline of the baseline data collected to date and the scope of the assessment. Table 12.2 sets out the comments received in Section 4.12 of the PINS Scoping Opinion Aspect Based Scoping Tables – Infrastructure and Other Marine Users, and how these have been addressed in this chapter. A full list of the PINS Scoping Opinion comments and responses will be presented within the project consultation report (submitted with the DCO Application). Regard has also been given to other stakeholder comments that were received in relation to the Scoping Report.



Table 12.2: Summary of consultation relating to I&OMU.

Date and consultation phase/ type	Consultation comments and key issues raised	Section where comment addressed
Scoping Opinion (PINS, 2021)	<p>Atlantic Crossing 1 and UK-Netherlands 12 telecommunications cables</p> <p>The Scoping Report seeks to scope this matter out on the grounds that both cables are disused. The Inspectorate agrees that this matter can be scoped out of further assessment.</p>	<p>These receptors have been scoped out from this assessment, as outlined in Paragraph 12.7.6.</p>
Scoping Opinion (PINS, 2021)	<p>Impacts on PEXA</p> <p>Figure 18.2 shows that the Proposed Development would cross several PEXA. The Scoping Report states that VE OWFL has consulted with the MoD on this matter and no concerns were raised. The Inspectorate notes that the response from the MoD (see Appendix 2 of this report) does not address this point. The ES should provide information on the PEXA and either provide an assessment of effects or a justification as to why no Likely Significant Effect (LSE) would arise.</p>	<p>Information on this receptor is provided in Paragraph 12.7.15 <i>et seq.</i>, with reference to Figure 12.6, and effects have been assessed within Section 12.10, Section 12.11, and Section 12.12 (as summarised in Table 12.17). It is important also to note that ongoing consultation will be required (and is planned) with the MoD in order to address these effects.</p>
Scoping Opinion (PINS, 2021)	<p>Effects on wind farm arrays</p> <p>The Scoping Report seeks to scope this matter out on the grounds that there would be no spatial overlap with existing or proposed OWF arrays so there would be no pathway for LSE. However, as described under ID 4.12.12 below, the Inspectorate has concerns about the definition of the study area for the Proposed Development. The Inspectorate is not in a</p>	<p>Information on this receptor is provided in Paragraph 12.7.1, with reference to Figure 12.2, and effects have been assessed within Section 12.10, Section 12.11, and Section 12.12 (as summarised in Table 12.17).</p>



Date and consultation phase/ type	Consultation comments and key issues raised	Section where comment addressed
	<p>position to agree to scope this matter from the assessment. Accordingly, the ES should include an assessment of these matters or the information demonstrating agreement with relevant stakeholders and the absence of LSE.</p>	
<p>Scoping Opinion (PINS, 2021)</p>	<p>Effects on Carbon Capture and Storage sites (CCS)</p> <p>The Scoping Report seeks to scope this matter out on the grounds that there would be no spatial overlap with existing or proposed CCS sites so there would be no pathway for LSE. Notwithstanding the Inspectorate’s concerns about the definition of the study area, the Inspectorate agrees that this matter can be scoped out of further assessment. Should proposed CCS sites be identified within the study area in future, the ES would need to address this matter.</p>	<p>Information on this receptor is provided in Paragraph 12.4.7. The study area is defined and justified in Paragraph 12.4.13 <i>et seq.</i>, with reference to Figure 12.1. Based on the above, the receptor has been scoped out of further assessment.</p>
<p>Scoping Opinion (PINS, 2021)</p>	<p>Effects on active, closed, or disused disposal sites</p> <p>The Scoping Report seeks to scope this matter out on the grounds that there would be no spatial overlap with these sites so there would be no pathway for LSE. The Inspectorate does not agree that this matter can be scoped out of further assessment at present. See comments under ID 4.12.3.</p>	<p>Information on this receptor is provided in Paragraph 12.7.9 <i>et seq.</i>, with reference to Figure 12.4, and effects have been assessed within Section 12.10, Section 12.11, and Section 12.12 (as summarised in Table 12.17). The study area is defined and justified in Paragraph 12.4.13 <i>et seq.</i>, with reference to Figure 12.1.</p>
<p>Scoping Opinion (PINS, 2021)</p>	<p>Effects on oil infrastructure</p> <p>The Scoping Report seeks to scope this matter out on the grounds that there would be no</p>	<p>Information on this receptor is provided in Paragraph 12.4.4 <i>et seq.</i>, with reference to Figure 12.3. The study area is defined and justified in</p>



Date and consultation phase/ type	Consultation comments and key issues raised	Section where comment addressed
	<p>spatial overlap with any existing or planned extraction sites or pipelines so there would be no pathway for LSE. The Inspectorate does not agree that this matter can be scoped out of further assessment at present. See comments under ID 4.12.3.</p>	<p>Paragraph 12.4.13 <i>et seq.</i>, with reference to Figure 12.1. Based on the above, the receptor has been scoped out of further assessment.</p>
<p>Scoping Opinion (PINS, 2021)</p>	<p>Effects on nuclear facilities</p> <p>The Scoping Report seeks to scope this matter out on the grounds that there would be no spatial overlap with any existing or planned nuclear facilities so there would be no pathway for LSE. The Inspectorate does not agree that this matter can be scoped out of further assessment at present. See comments under ID 4.12.3.</p>	<p>Information on this receptor is provided in Paragraph 12.4.8, with reference to Figure 12.3. The study area is defined and justified in Paragraph 12.4.13 <i>et seq.</i>, with reference to Figure 12.1. Based on the above, the receptor has been scoped out of further assessment. Based on the above, the receptor has been scoped out of further assessment.</p>
<p>Scoping Opinion (PINS, 2021)</p>	<p>Effects on wave and tidal energy sites</p> <p>The Scoping Report seeks to scope this matter out on the grounds that there would be no spatial overlap with any such sites so there would be no pathway for LSE. Notwithstanding the Inspectorate's concerns about the definition of the study area, the Inspectorate agrees that this matter can be scoped out of further assessment. Should proposed wave and tidal energy sites be identified within the study area in future, the ES would need to address this matter.</p>	<p>Information on this receptor is provided in Paragraph 12.4.3. The study area is defined and justified in Paragraph 12.4.13 <i>et seq.</i>, with reference to Figure 12.1. Based on the above, the receptor has been scoped out of further assessment.</p>



Date and consultation phase/ type	Consultation comments and key issues raised	Section where comment addressed
Scoping Opinion (PINS, 2021)	<p>Effects on UXO disposal sites</p> <p>The Scoping Report seeks to scope this matter out on the grounds that there would be no spatial overlap with any existing or planned UXO disposal sites so there would be no pathway for LSE. The Inspectorate does not agree that this matter can be scoped out of further assessment at present. See comments under ID 4.12.3.</p>	<p>Information on this receptor is provided in Paragraph 12.4.11, with reference to Figure 12.4. This receptor has been scoped out on the grounds that there would be no pathways for LSE.</p>
Scoping Opinion (PINS, 2021)	<p>Alterations in wave energy direction and periods from the presence of infrastructure that could affect recreational users</p> <p>The Scoping Report states that no measurable changes in wave energy at the coast are expected based on the assessments for similar projects including Galloper and Greater Gabbard OWF. The Inspectorate considers that it is premature to conclude this when the assessment of effects on physical processes has not been carried out. Accordingly, the ES should include an assessment of these matters or the information referred to demonstrating agreement with the relevant stakeholders and the absence of an LSE.</p>	<p>Alterations to wave energy direction and periods from the presence of VE infrastructure are assessed within Volume 1, Chapter 2: Marine Geology, Oceanography and Physical Processes. Impacts on recreational users are assessed within Volume 3, Chapter 3: Socio-Economic Tourism and Recreation. Marine and coastal recreational activities and water sports are outside the scope of this chapter and impacts on this receptor are therefore not discussed further.</p>
Scoping Opinion (PINS, 2021)	<p>Transboundary impacts</p> <p>The Scoping Report seeks to scope out this matter on the grounds that effects would be localised; the EEZs for other European Economic Area states are at least 16km away.</p>	<p>A screening of transboundary effects has been carried out and is present in Volume 1, Annex 3.2: Transboundary Screening. No potential transboundary impacts were screened into the assessment for I&OMU. Information on this receptor is provided in provided in Paragraph 12.7.2 <i>et seq.</i> with</p>



Date and consultation phase/ type	Consultation comments and key issues raised	Section where comment addressed
	<p>However, the Scoping Report also refers to various cables which could interact with the Proposed Development including the proposed Neuconnect Interconnector which would run between the UK and Germany. On the basis of the evidence currently available the Inspectorate is not convinced that effects on an EEA state would not arise. Accordingly, the ES should include an assessment of these matters or the information referred to demonstrating agreement with the relevant stakeholders and the absence of an LSE.</p>	<p>reference to Figure 12.3. Impacts on these receptors have been assessed as part of the project-alone assessment within Section 12.10, Section 12.11, and Section 12.12 (as summarised in Table 12.17).</p>
<p>Scoping Opinion (PINS, 2021)</p>	<p>Study Area</p> <p>The definition of the study area in paragraph 18.2.1 of the Scoping Report is confusing. Figure 18.1 shows the study area comprising the array areas and the preferred offshore cable export route but not the area of the Outer Thames Estuary which is also stated to have been reviewed. On the basis of the evidence in the Scoping Report the Inspectorate is not convinced that the study area shown on Figure 18.1 is sufficient to capture the significant effects which could arise as a result of the Proposed Development. Table 18.3 states that displacement of activities or access would be considered for all phases of the Proposed Development but it is difficult to see how a meaningful assessment could be</p>	<p>The study area is defined and justified in Paragraph 12.4.13 <i>et seq.</i>, with reference to Figure 12.1. An assessment of the potential cumulative impacts on I&OMU receptors is provided in Section 12.13.</p>



Date and consultation phase/ type	Consultation comments and key issues raised	Section where comment addressed
	<p>undertaken on the basis of the study area shown on Figure 18.1. It is also unclear how cumulative effects would be considered which is of particular concern given the proximity of the North Falls OWF to the Proposed Development. The ES should provide a clear justification for the extent of the study area and how it relates to the zone of influence for the Proposed Development.</p>	
<p>Scoping Opinion (PINS, 2021)</p>	<p>Assessment methodology</p> <p>The Scoping Report has not provided a description of the methodology that would be used in the assessment or listed any guidance that might be used to inform the methodology. As such the Inspectorate has limited confidence that the assessment will be comprehensive. The ES should explain the methods behind the assessment and why they are considered suitable to provide a robust assessment of effects.</p>	<p>The assessment has been carried out in accordance with the EIA methodology presented in Volume 1, Chapter 3: EIA Methodology. This has been supported by expert judgement and continued input from stakeholders.</p>
<p>Scoping Reponses (MoD), 2021)</p>	<p>The designated site area was acknowledged to overlap four military PEXA. At the time of writing, it was not anticipated that the development would have any substantial impact though further assessment will take place when additional information is available.</p>	<p>Information on this receptor is provided in Paragraph 12.7.15, and effects have been assessed within Section 12.10, Section 12.11, and Section 12.12 (as summarised in Table 12.17). Ongoing consultation has been planned with the MoD in order to address these effects.</p>
<p>Scoping Response (Babergh District Council, 2021)</p>	<p>Whilst we have no comments on the specific content of the report the council concerns generally about the timing and impacts of the project in context and interaction with other large</p>	<p>Impacts on tourism are assessed within Volume 3, Chapter 3: Socio-Economic, Tourism and Recreation. An assessment of the potential cumulative impacts on I&OMU receptors is provided in Section 12.13.</p>



Date and consultation phase/ type	Consultation comments and key issues raised	Section where comment addressed
	scale energy projects in the region, particularly having regards to impacts on infrastructure and tourism. The council also reinforces the need for adequate assessment of potential cumulative impacts.	
(Tarmac Marine Ltd, 2021)	VE OWFL has agreed in-principle with Tarmac Marine Ltd that there are no issues despite the close proximity of their licensed aggregate areas.	Information on marine aggregate sites is provided in Paragraph 12.7.15 <i>et seq.</i> , and effects have been assessed within Section 12.10, Section 12.11, and Section 12.12 (as summarised in Table 12.17).
(Tarmac Marine Ltd, 2022)	Having examined the proposals, we have no concerns with respect to the siting of the turbines further to the east of the existing arrays in the Galloper area. Our ships do not transit in that area. Our ships do regularly navigate through the traffic separation zones just inshore of the existing wind farms. I note that this is where the export cable corridor is proposed to go so we would be grateful to be informed through a Notice to Mariners when eventually cable laying works are to begin during windfarm construction	Effects on marine aggregate sites, including those owned by Tarmac Marine Ltd, have been assessed within Section 12.10, Section 12.11, and Section 12.12 (as summarised in Table 12.17). Embedded mitigation measures, including the use of Notices to Mariners (NtM), are outlined in Table 12.13.

12.4 SCOPE AND METHODOLOGY

SCOPE OF THE ASSESSMENT

IMPACTS SCOPED IN FOR ASSESSMENT

12.4.1 The following impacts have been scoped into this assessment:

- > Construction:
 - > Impact 1: Activity or access displacement associated with increased vessel movements and the use of safety zones during construction activities;



- > Impact 2: Temporary increases in Suspended Sediment Concentrations (SSCs) and subsequent deposition; and
- > Impact 3: Direct disturbance and damage to existing assets and infrastructure.
- > Operation and maintenance:
 - > Impact 4: Activity or access displacement associated with increased vessel movements and the use of safety zones during operational and maintenance activities; and
 - > Impact 5: Physical presence of infrastructure.
- > Decommissioning:
 - > Impact 6: Activity or access displacement associated with increased vessel movements and the use of safety zones during decommissioning activities;
 - > Impact 7: Temporary increases in SSCs and subsequent deposition; and
 - > Impact 8: Direct disturbance and damage to existing assets and infrastructure.
- > Cumulative:
 - > Impact 9: Cumulative activity or access displacement associated with increased vessel movements and the use of safety zones; and
 - > Impact 10: Cumulative temporary increases in SSC and subsequent sediment deposition.

Table 12.3: Receptors affected by impacts scoped into assessment.

Impact	OWFs	Subsea Cables	Marine Disposal	Marine Aggregates	Military Areas	Marine Structures
1	✓	✓	✓	✓	✓	
2			✓	✓		
3	✓	✓				✓
4	✓	✓	✓	✓	✓	
5		✓		✓	✓	
6	✓	✓	✓	✓	✓	
7			✓	✓		
8	✓	✓				
9	✓	✓	✓	✓	✓	
10			✓	✓		



IMPACTS SCOPED OUT OF ASSESSMENT

12.4.2 On the basis of the baseline environment and the project description outlined in Volume 2, Chapter 1: Offshore Project Description and in accordance with the Scoping Opinion (PINS, 2021), a number of impacts have been scoped out (see Table 12.2), these include:

- > Construction and decommissioning:
 - > Impacts on wave and tidal energy sites;
 - > Impacts on oil and gas infrastructure;
 - > Impacts on CCS;
 - > Impacts on nuclear facilities;
 - > Impacts on unexploded ordnance (UXO) disposal sites; and
 - > Impacts on wastewater assets.

OTHER OFFSHORE ENERGY

12.4.3 The Mermaid hybrid wind and wave energy park is located approximately 50 km from the coast of Belgium, approximately 40 km from the VE array area and offshore Export Cable Corridor (ECC). There are no other identified wave or tidal stream energy development sites existing or planned within 50 km of VE. These distances are outside all of the study areas, as outlined in Paragraph 12.4.13 *et seq.* and shown on Figure 12.1. Therefore, impacts on other offshore energy installations have been scoped out of assessment and are not considered further.

OIL AND GAS INFRASTRUCTURE

12.4.4 There are no oil and gas installations or abandoned exploration wells within 90 km of VE infrastructure. New blocks awarded under the 32nd licensing rounds are to the north of the study area off the Norfolk coast. There is no overlap with existing or provisional licence blocks, or other wells (live or abandoned). Given the lack of existing activity and the limited historical oil and gas activity in this area, it is assumed that this part of the North Sea does not have high potential for exploration.

12.4.5 The closest active gas pipeline (PL1339 Bacton to Zeebrugge) is located approximately 12.9 km east of the northern VE array area, oriented approximately north to south (shown on Figure 12.3). The offshore ECC does not cross any existing oil and gas pipelines and there are no assets within the VE array areas. Although the PL1339 pipeline is located within the Traffic Study Area, as shown in Figure 12.3, no direct or indirect interaction with the asset has been anticipated. Given that existing oil and gas infrastructure are beyond the proposed location of offshore infrastructure associated with VE and no interaction with them is anticipated, impacts on oil and gas infrastructure have been scoped out of assessment and are not considered further.



CARBON CAPTURE AND STORAGE (CCS)

- 12.4.6 CCS is likely to have a major role in reducing UK carbon dioxide (CO₂) emissions in the future, utilising, for example, depleted subsea oil and gas reservoirs to provide long term storage of CO₂. There are currently six existing CO₂ appraisal and storage licenses on the UK Continental Shelf. The North Sea Transition Authority (NSTA) launched the UK's first carbon storage licencing round in June 2022, with 13 areas available for bids. The areas are located within the East Irish Sea, Northern North Sea, Central North Sea, and Southern North Sea. Awards are expected in early 2023, with sites potentially becoming operational between 2027 – 2029 (NTSA, 2022).
- 12.4.7 The closest available bid area for carbon storage licencing is located approximately 90 km from the VE Red Line Boundary (RLB), with the nearest existing licence area located over 130 km away. Given the distances involved, these areas are outside the study areas, as outlined in Paragraph 12.4.13 *et seq.* and shown on Figure 12.1. Therefore, no direct or indirect interaction with CCS activities is anticipated and impacts on this receptor have been scoped out of assessment and are not considered further.

NUCLEAR

- 12.4.8 EDF's Sizewell nuclear facilities (Sizewell A, B and C) are located on the Suffolk coast approximately 36 km from VE at the closest point (Figure 12.3). Both Sizewell A (which is in the process of being decommissioned) and Sizewell B have cooling water outfall and intake infrastructure that extends into the marine environment.
- 12.4.9 In July 2022, an application for Sizewell C power station, located immediately to the north of the existing Sizewell B power station, was granted development consent by the SoS for BEIS. Development comprises the delivery of a new nuclear power station and onsite associated facilities. Installation of offshore infrastructure for the development will require temporary safety zones to be applied surrounding working construction vessels.
- 12.4.10 Given that these nuclear facilities are located outside the study areas, outlined in Paragraph 12.4.13 *et seq.* and shown on Figure 12.1, no direct and indirect interaction with them is anticipated. Therefore, impacts on nuclear facilities have been scoped out of assessment and are not considered further.

UXO DISPOSAL SITES

- 12.4.11 Two explosive dumping areas have been identified within the vicinity of VE, located approximately 6 km from the ECC and 14 km from the northern array area, respectively (see Figure 12.4). Impacts on these areas as a receptor have been scoped out on the grounds that there would be no pathway for Likely Significant Effect (LSE), as outlined in Table 12.2. However, impacts of UXO clearance are considered as a pathway on other receptors.

WASTEWATER ASSETS

- 12.4.12 The Clacton Waste Water Treatment works and its two outfalls are located to the south of the landfall zone within the RLB, as shown in Figure 12.3. Impacts on these receptors have been scoped out on the grounds that there would be no pathway for LSE.



STUDY AREA

12.4.13 The dynamic study area is presented in Figure 12.1 and varies in scale depending on the particular receptor. For each receptor described in this chapter, the spatial variability has been considered and an appropriate baseline description of that receptors study area is provided. The study area for this chapter is variable, depending on the nature of potential impacts being assessed. The justification for these study areas is outlined below, with the impacts assessed using each study area shown in Table 12.4.

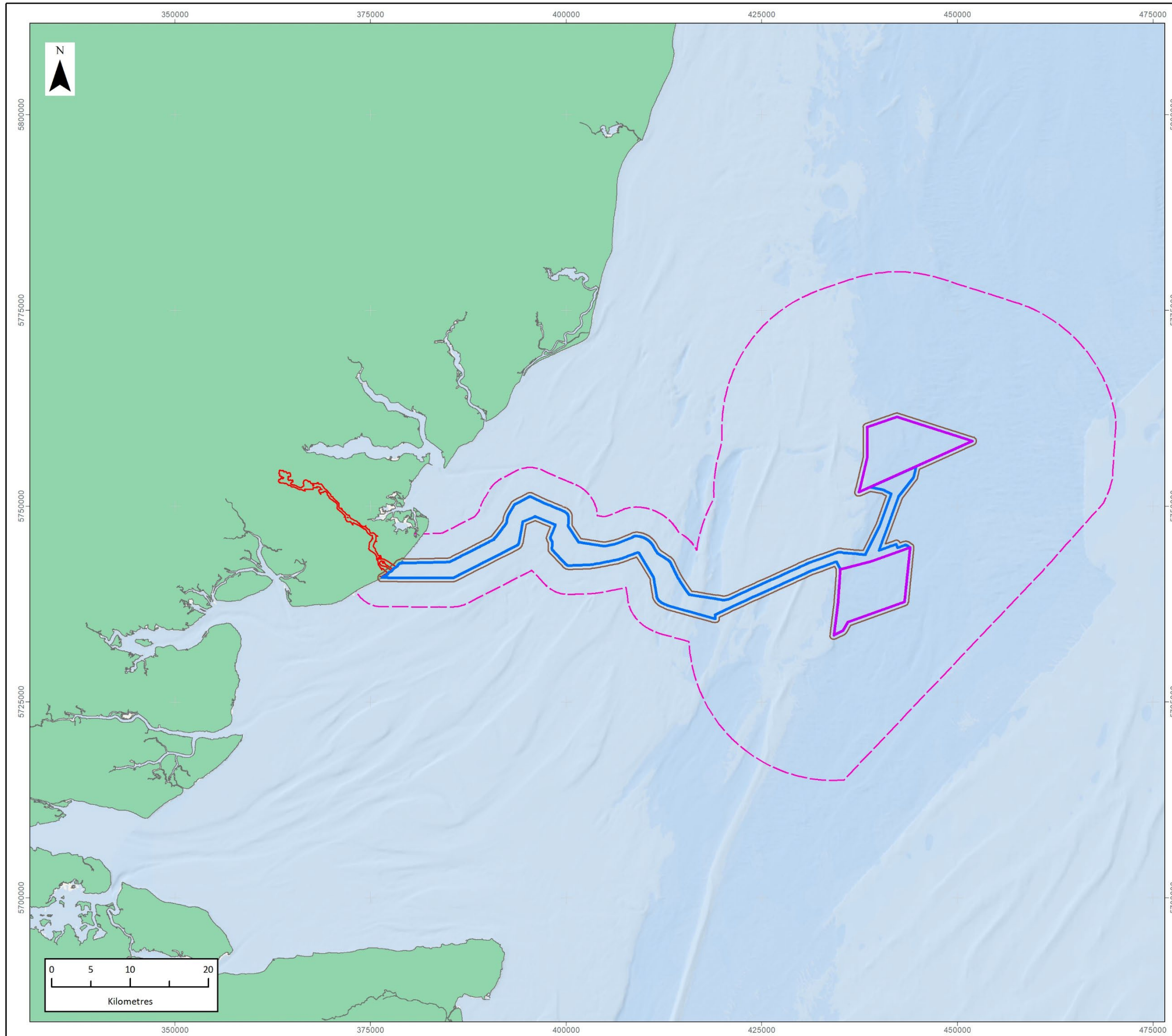
- > For impacts associated with direct overlap of activities, this is limited to the array areas, offshore ECC and 500 m around these areas (to include required safety zones), as shown in Figure 12.1. This is known as the Direct Impacts Study Area.
- > For impacts associated with increased SSCs and deposition, the study area is consistent with the Zol defined in the physical processes assessment in Volume 2, Chapter 2: Marine Geology, Oceanography and Physical processes and represents the largest distance at which increased sediment deposition is likely to occur. This is shown on Figure 12.1 and hereafter referred to as the Spring Tidal Excursion Ellipse (STEE) Study Area.
- > For impacts associated with vessel displacement, the study area extends 2 nm from the offshore ECC and 10 nm from the VE array areas, excluding the portion of the 10 nm buffer intersecting the North Hinder Junction and North Hinder South TSS. This is consistent with the approach used in Volume 2, Chapter 9: Shipping and Navigation and is based on standard practice for shipping and navigation assessment study areas. This is referred to as the Traffic Study Area (shown on Figure 12.1).

12.4.14 The exact export cable route is yet to be determined. However, the Direct Impacts Study Area includes an ECC within which the export cables will be routed to link the offshore array with the onshore cables at the landfall location.



Table 12.4: Study area used to assess impacts scoped into assessment.

Impact	Study Area		
	Direct Impacts Study Area	Spring Tidal Excursion Ellipse (STEE) Study Area	Traffic Study Area
Impact 1: Activity or access displacement associated with increased vessel movements and the use of safety zones during construction activities			✓
Impact 2: Temporary increases in Suspended Sediment Concentrations (SSCs) and subsequent deposition		✓	
Impact 3: Direct disturbance and damage to existing assets and infrastructure	✓		
Impact 4: Activity or access displacement associated with increased vessel movements and the use of safety zones during operational and maintenance activities			✓
Impact 5: Physical presence of infrastructure	✓		
Impact 6: Activity or access displacement associated with increased vessel movements and the use of safety zones during decommissioning activities			✓
Impact 7: Temporary increases in SSCs and subsequent deposition		✓	
Impact 8: Direct disturbance and damage to existing assets and infrastructure	✓		



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Red Line Boundary
- Spring Tidal Excursion Ellipse (STEE) Study Area
- Traffic Study Area

Data Source:
 Basemap: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:
Study Area and Zone of Influence

VER	DATE	REMARKS	Drawn	Checked
1	22/02/2023	For Issue	SWM	AK

DRAWING NUMBER:
12.1

SCALE: 1:500,000 PLOT SIZE: A3 DATUM: WGS84 PROJECTION: UTM31N





DATA SOURCES

12.4.15 The data sources that have been collected and used to inform this assessment are summarised in Table 12.5.

Table 12.5: Data sources used to inform the I&OMU PEIR assessment.

Source	Date	Summary	Coverage of study area
The Crown Estate offshore wind leasing sites Rounds 1 – 4	2022	Offshore renewable bidding areas	Full coverage of the study area
The Crown Estate, Aggregate Licence Area Charts	2021	Active marine aggregate extraction areas	Full coverage of the study area
British Marine Aggregate Production Association (BMAPA) annual reports	2010 – 2022	Active and inactive Aggregate extraction areas for the East coast area	Full coverage of the study area
Centre for Environment, Fisheries and Aquaculture Science (Cefas) GIS shapefile of Disposal Sites	2021	Disposal sites also includes munitions and disposal areas	Full coverage of the study area
Kingfisher Information Service – Offshore Renewables and Cable Awareness (KIS-ORCA) charts	2022	Offshore cables (active and disused), interconnectors and pipelines	Full coverage of the study area
Ocean Wise marine themes	2021	MoD PEXA charts	Full coverage of the study area
MMO, Marine Case Management System Public Register	2022	Public register of marine licence applications in the vicinity of the VE array area and offshore ECC	Full coverage of the study area



ASSESSMENT METHODOLOGY

- 12.4.16 The Proposed Development-wide general approach to assessment is set out in Volume 1, Chapter 3: EIA Methodology. The assessment methodology for I&OMU for the PEIR is consistent with that provided in the Scoping Report and no changes have been made since the scoping phase.
- 12.4.17 The assessment of potential impacts on I&OMU is based on the maximum development scenario as identified from the design envelope (often referred to as the 'Rochdale Envelope') (see Volume 2, Chapter 1: Offshore Project Description). The key maximum assessment assumptions comprise the layout of the wind farm, the number and size of offshore structure, the type and size of foundations used, as well as the timing and duration of the proposed offshore works (see Table 12.12).
- 12.4.18 The assessment of impacts and effects on I&OMU is supported by baseline data collection to ensure identification of relevant details on the I&OMU receptors within the study area. The current baseline conditions presented in Section 12.7 sets out currently available information from the study area/s. The collation of baseline information and use across the study area is ongoing and will be supported by the consultation provided for following publication of this PEIR, together with meetings with relevant stakeholders (as required) in order to ensure appropriate detail is obtained to inform the assessment of potential impacts.
- 12.4.19 Consultation with operators (as required) was also undertaken to establish the current status of known and planned infrastructure and other users within the study area/s. Existing and planned licensable activities have been identified and a timeline for future activities associated with the existing or planned infrastructure has been established. Proposed developments which have limited levels of information or certainty available are outlined in the future baseline conditions, although the effects on these developments are not able to be fully determined and therefore have not been assessed.
- 12.4.20 Cumulative effects have been assessed by taking into consideration other relevant developments that are in the vicinity of the development zone and which have the potential to affect the same receptors. This includes existing developments as well as proposed developments which have a high level of certainty or information available (Tier 1 as set out in Volume 2, Annex 3.1: Cumulative Effects Assessment Methodology, and outlined here in Table 12.15). Where other developments are expected to be completed prior to the construction of VE, and the effects of these developments are fully determined, the effects arising from the developments are considered as part of the baseline but may also be considered as part of the construction and operational cumulative assessment. Developments forming part of the dynamic baseline, and those included in the cumulative assessment are clearly identified in the Cumulative Effects Assessment (CEA).

12.5 ASSESSMENT CRITERIA AND ASSIGNMENT OF SIGNIFICANCE

- 12.5.1 This assessment is consistent with the EIA methodology presented in Volume 1, Chapter 3: EIA Methodology.



12.5.2 The approach to determining the significance of the effect is a two-stage process that involves defining sensitivity of the receptors and the magnitude of the impacts against set criteria. This section describes the criteria applied in this chapter to assign values of sensitivity to the receptors and determine the magnitude of potential impacts. Further details are provided in Volume 1, Chapter 3: EIA Methodology.

12.5.3 Magnitude of impact is defined in Table 12.6. The magnitude of potential impacts is defined by a series of factors including the spatial extent of any potential interaction, the likelihood, duration, frequency and reversibility of a potential impact.

Table 12.6: Impact magnitude definitions.

Magnitude	Description/ reason
High	Total loss of ability to continue activities. Impact is of extended physical extent and of long-term duration (i.e. total life of VE) and/ or frequency of repetition is continuous and/ or effect is not reversible.
Medium	Loss or alteration to significant portions of key components of current activity leading to a reduction in the level of activity that may be undertaken. Physical extent of impact is moderate and/ or of medium-term duration (i.e. operational period) and/ or frequency of repetition is medium to continuous and/ or effect is not reversible for the project phase.
Low	Minor shift away from baseline, leading to a reduction in level of activity that may be undertaken. Physical extent of impact is low and/ or of short to medium term duration (i.e. construction period) and/ or frequency of repetition is low to continuous and/ or effect is not reversible for the project phase.
Negligible	Very slight change from baseline condition. Physical extent of impact is negligible and/ or of short-term duration (i.e. less than two years) and/ or frequency of repetition is negligible to continuous and/ or effect is reversible.

12.5.4 Sensitivity/ importance of the receptor is defined in Table 12.7. The sensitivities (or importance) of I&OMU receptors are defined by both their potential vulnerability to an impact from the proposed development, their recoverability, and the value or importance of the receptor. The definition of terms relating to the sensitivity of I&OMU receptors is detailed in Table 12.7. Where a receptor could reasonably be assigned more than one level of sensitivity, professional judgement has been used to determine which level is applicable.



Table 12.7: Sensitivity/importance of the receptor.

Receptor sensitivity/ importance	Definition
High	Receptor is of high value or importance, with critical importance to the local, regional or national economy. Receptor is highly vulnerable to impacts that may arise from VE and recoverability is long-term or not possible.
Medium	Receptor is of medium value or importance, with reasonable contribution to the value of the local, regional or national economy. Receptor is moderately vulnerable to impacts that may arise from VE and has moderate to high levels of recoverability.
Low	Receptor is of minor value or importance with small levels of contribution to the value of the local, regional or national economy. Receptor is not generally vulnerable to impacts that may arise from VE and/ or has high recoverability.
Negligible	Receptor is of very low value or importance, with negligible contribution to the value of the local, regional or national economy. Receptor is not vulnerable to impacts that may arise from VE and/ or has high recoverability.

12.5.5 The significance of the effect on I&OMU receptors will be determined by correlating the sensitivity of the receptor and the magnitude of the impact. The method employed for this preliminary assessment is presented in Table 12.8, where the final assessment for each effect based upon expert judgement. For the purpose of this PEIR, any effects with a significance level of minor or less are considered as not significant in terms of the EIA Regulations (2017).



Table 12.8: Matrix to determine effect significance.

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

Note: shaded cells are defined as significant with regards to the EIA Regulations 2017¹.

12.6 UNCERTAINTY AND TECHNICAL DIFFICULTIES ENCOUNTERED

12.6.1 Several infrastructure projects are being planned or have been proposed within the vicinity of VE, including the NeuConnect Interconnector (Tier 1) and several Tier 2 and Tier 3 proposed developments outlined further in 12.7.23 *et seq.* The exact routes and locations of these projects, as well as their construction timescales, are not currently available and cannot be assessed in full (further details are provided in Table 12.15). Therefore, this assessment seeks to identify a reasonable worst-case scenario based on the information currently available. This should serve to reduce the risk of later design modifications falling outside of the assessment envelope. The worst-case scenario is assessed according to the specific impact, details of which are outlined in the relevant assessment section (see Section 12.10, Section 12.11, and Section 12.12).

12.7 EXISTING ENVIRONMENT

OFFSHORE WINDFARMS

12.7.1 The largest Zol for all impacts considered on OWFs (see 12.4.13) is the Traffic Study Area, as shown in Figure 12.1. OWFs outside this area have not been considered further in this assessment. There is no spatial overlap of any other OWFs within the VE array areas. The following OWFs (proposed, consented or operational) have been identified in the Traffic Study Area, as presented in in Figure 12.2 and Table 12.9.

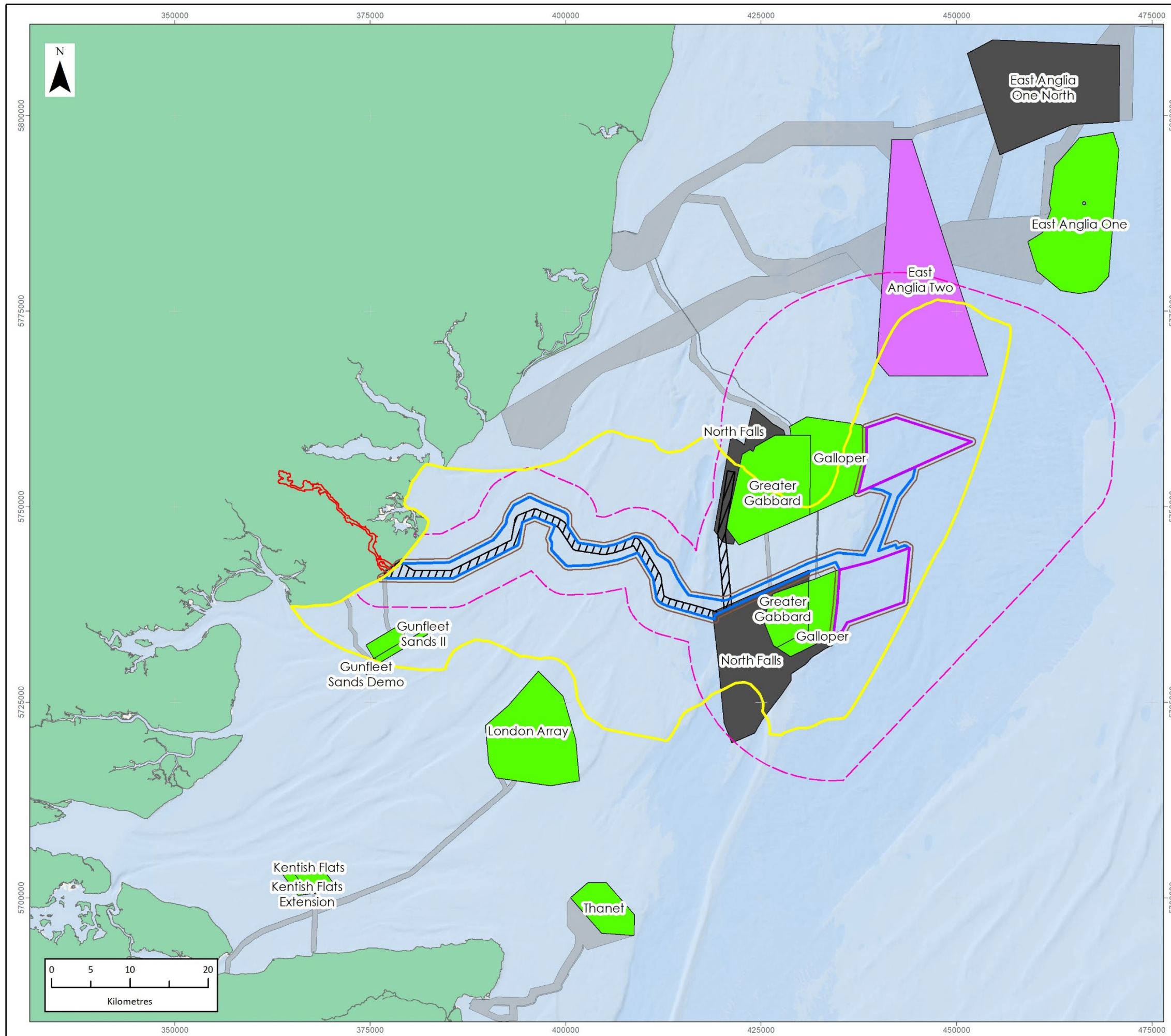
¹ The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017



- > Gunfleet Sands 1 and 2 OWF. The Gunfleet Sands 1 and 2 OWF is located approximately 7 km off the Essex coast, with the export cable running north to make landfall near Holland-on-sea. The VE offshore ECC overlaps slightly with this export cable close to landfall.
- > Galloper OWF, located immediately west of VE. The Galloper OWF export cable runs northwest to make landfall near Sizewell. The VE offshore ECC does not intersect with this export cable although it does cross the interconnector cable linking the north and south separate Galloper array areas.
- > Greater Gabbard OWF, located to the west of Galloper OWF. The Greater Gabbard OWF export cable runs northwest to make landfall near Sizewell. The VE offshore ECC does not intersect with this export cable although it does cross the interconnector cable linking the north and south Greater Gabbard array areas.
- > East Anglia TWO OWF, located to the north of VE. Consent for this development was granted in March 2022. The East Anglia TWO OWF ECC runs west to make landfall between Sizewell and Thorpeness, with a small overlap between the cable and the VE Traffic Study Area.
- > North Falls OWF. Greater Gabbard Extension, known as North Falls OWF is also being progressed as part of the 2017 Crown Estate extensions round. Further details are provided in 12.7.22 *et seq.*

Table 12.9: Operational and consented OWF in the I&OMU Traffic Study Area.

Offshore Wind Farm	Operator	Distance from VE Array Area (km)	Distance from VE ECC (km)
Operational			
Galloper	RWE	0.0	0.0
Greater Gabbard	SSE and RWE	3.3	0.6
Gunfleet Sands II	Ørsted	51.9	6.5
Gunfleet Sands I	Ørsted	54.5	6.0
East Anglia TWO	East Anglia TWO Limited	4.2	12.1



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Red Line Boundary
- Spring Tidal Excursion Ellipse (STEE) Study Area
- Traffic Study Area

Offshore Wind Farm Status:

- Concept/Early Planning
- Consented
- In Planning
- Operational
- Offshore Wind Farm Cable Routes (TCE)
- North Falls Scoping Offshore Cable Route

Data Source:
 Basemap: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

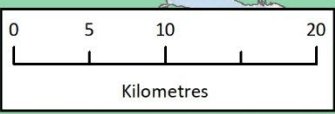
PROJECT TITLE:
 FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:
 Other Offshore Infrastructure

VER	DATE	REMARKS	Drawn	Checked
1	22/02/2023	For Issue	SWM	AK

DRAWING NUMBER:
 12.2

SCALE: 1:500,000 PLOT SIZE: A3 DATUM: WGS84 PROJECTION: UTM31N





SUBSEA CABLES

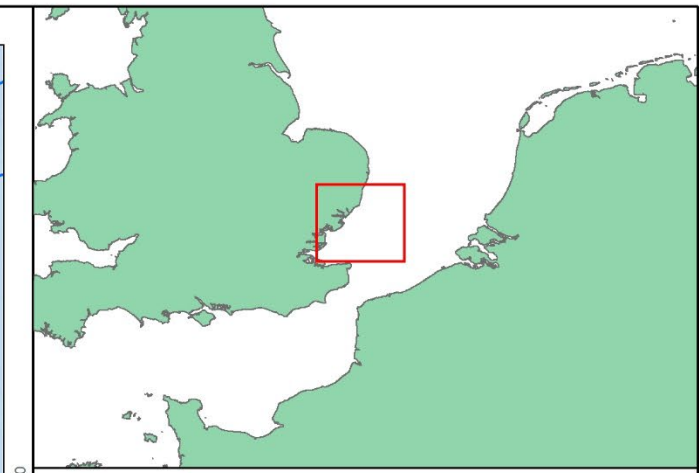
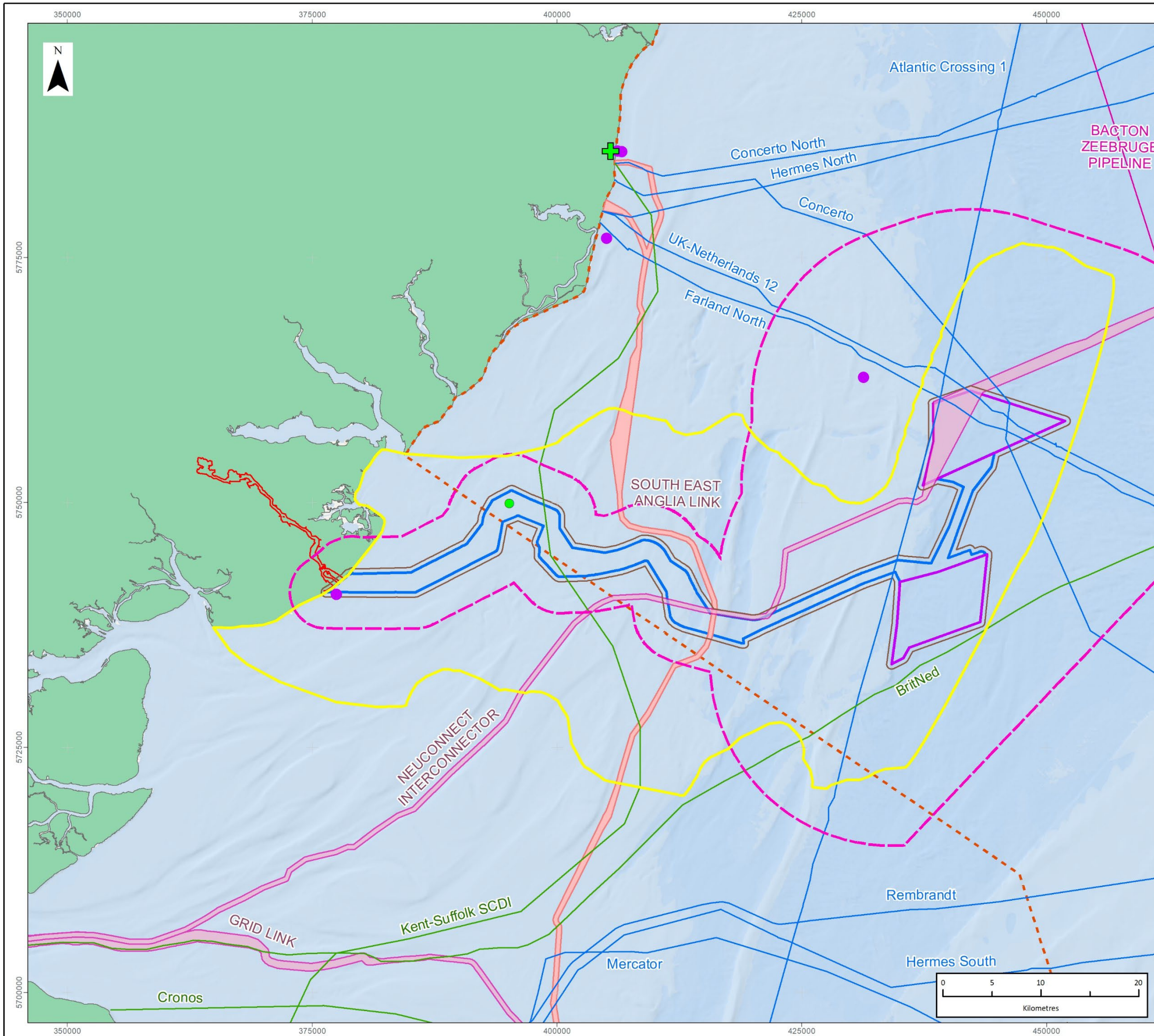
- 12.7.2 'Subsea cables' is a broad term for a range of cables that are beneath the sea surface, these cables are typically (but not exclusively) subsea telecoms, power cables and interconnector cables).
- 12.7.3 The largest Zol for all impacts considered on subsea cables (see 12.4.13) is the Traffic Study Area, as shown in Figure 12.1. The baseline data collection exercise identified a number of subsea cables within this study area as shown in Figure 12.3. Those subsea cables that have the potential for interaction with VE are listed below.

TELECOMMUNICATION CABLES

- 12.7.4 There are two operational cables present that interact directly with the VE array areas, as shown on Figure 12.3. These comprise:
- > Concerto 1S (crosses through the VE northern array area); and
 - > Farland (crosses through the VE northern array area).
- 12.7.5 VE OWFL is currently engaging with the owners of these assets to discuss crossing and proximity agreements.
- 12.7.6 Both Atlantic Crossing 1 (AC1) – Seg B1 and UK – Netherlands 12 (see Figure 12.3) are out of service telecommunications cables and have been screened out from further assessment as agreed in the Scoping Opinion (Table 12.2).

INTERCONNECTOR CABLES

- 12.7.7 The BritNed Interconnector is a 1,000 MW high-voltage direct-current (HVDC) submarine power cable linking the Isle of Grain in Kent, UK to Maasvlakte in Rotterdam, the Netherlands. It is oriented approximately north-west to south-east and is located approximately 0.9 km south of the southern VE array area. VE OWFL is engaging with the owner of this asset to discuss proximity and any further engagement needed.
- 12.7.8 The NeuConnect Interconnector is a 1,400 MW HVDC submarine power cable between the UK and Germany (Figure 12.3), for which a marine license (MLA/2019/00488) was granted in March 2022 (MMO, 2022). The currently proposed route passes through the VE northern array. VE OWFL is currently engaging with the asset owner to discuss crossing and proximity agreements.



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Red Line Boundary
- Spring Tidal Excursion Ellipse (STEE) Study Area
- Direct Impacts Study Area
- Traffic Study Area
- Sealand (Offshore Platform)
- Diffuser / Wastewater Asset
- + Sizewell Power Station (A B C)

Oceanwise MTF Data:

- Diffuser / Wastewater Asset
- + Sizewell Power Station (A B C)

Subsea Cables:

- Power
- Telecom
- Pipelines
- Nautilus Interconnector Study Area
- Additional Subsea Cables Route Licence Areas
- SeaLink Interconnector

Data Source:
Basemap: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:
Other Offshore Infrastructure

VER	DATE	REMARKS	Drawn	Checked
1	27/02/2023	For Issue	SWM	AK

DRAWING NUMBER:
12.3

SCALE: 1:400,000 | PLOT SIZE: A3 | DATUM: WGS84 | PROJECTION: UTM31N





MARINE DISPOSAL

12.7.9 Since the end of 1998, most forms of disposal at sea have been prohibited. The main exceptions are the disposal of dredged material originating from ports and harbours for the purposes of maintaining navigable shipping channels and the disposal of material originating from the installation of offshore infrastructure (for instance material from sandwave clearance, seabed preparation and drill arisings).

12.7.10 The largest Zols for impacts considered on marine disposal areas (see 12.4.13) are the Traffic Study Area and the STEE, as shown in Figure 12.1. There are 14 disposal sites within the Traffic Study Area, as presented within Figure 12.4 and Table 12.10, of which two are open (Inner Gabbard East (TH056) and East Anglia One (TH023)). There are 23 sites within the STEE, three of which are open. There are no open disposal sites within the Direct Impacts Study Area. Open disposal sites within the STEE comprise:

- > Harwich Haven (TH027);
- > Inner Gabbard (TH052); and
- > Inner Gabbard East (TH056).

Table 12.10: Marine disposal sites located within the vicinity of the study area.

Code	Disposal Site	Distance to array area (km)	Distance to offshore ECC (km)	Distance from STEE (km)
Open				
TH056	Inner Gabbard East	16.4	7.2	0.0
TH052	Inner Gabbard	20.6	3.9	0.0
TH027	Harwich Haven	30.0	4.2	0.0
TH023	East Anglia One	16.4	24.0	5.4
Disused				
TH054	Area 108/3	26.4	3.4	0.0
TH046	The Well	48.3	4.0	0.0
Closed				
TH057	Galloper OWF	0.0	0.0	0.0
TH024	Warren Spring Exptl Area 2/1	0.4	0.0	0.0
NS100	BRITNED	0.5	6.3	0.0
TH075	Warren Spring Exptl Area 1	2.3	9.5	0.0
TH025	Warren Spring Exptl Area 2	13.2	0.0	0.0



Code	Disposal Site	Distance to array area (km)	Distance to offshore ECC (km)	Distance from STEE (km)
NS111	North Sea Dredge Test	16.2	21.6	0.0
TH055	North West Shipwash	34.3	0.1	0.0
HU199	North West Shipwash	34.3	0.2	0.0
TH042	Roughs Tower	36.8	0.0	0.0
TH045	Roughs Tower Extension	37.1	0.0	0.0
TH040	Roughs Tower L	37.1	0.0	0.0
TH049	Roughs Tower 'E'	37.5	0.1	0.0
TH028	Roughs Tower M	37.5	0.3	0.0
TH041	Roughs Tower C	37.5	0.3	0.0
TH044	Roughs Tower A	37.8	0.5	0.0
TH039	Roughs Tower D	37.8	1.0	0.0
TH043	Roughs Tower B (Circular)	38.8	1.5	0.0
TH030	Harwich Rock Dump	46.3	4.1	0.0

MARINE AGGREGATES

12.7.11 The marine aggregate industry is licensed commercially by TCE; however, production agreements are only issued once the operator has obtained a Marine Licence under the Marine and Coastal Access Act (MCAA) (2009). A licence allows extraction to take place for a set amount of time (usually <15 years) and is accompanied by operating conditions such as maximum extraction volumes, as well as environmental measures and monitoring requirements.

12.7.12 The largest Zols for impacts considered on marine aggregate areas (see 12.4.13) are the Traffic Study Area and the STEE, as shown in Figure 12.1. There are nine active marine aggregate extraction sites areas in the Traffic Study Area, as well as three Exploration and Option Areas (Figure 12.5). There are six active marine aggregate extraction sites areas in the STEE, as well as two Exploration and Option Areas (Figure 12.5). Details of these areas are listed in Table 12.11 below. Production areas marked with an asterisk have not been dredged since approximately 2015, although this is not necessarily a representation of their future use (BMAPA, 2022).



Table 12.11: Marine aggregate sites within the VE study areas.

Licence Area	Operator	Area Name	Status	Distance from array area (km)	Distance from offshore ECC (km)	Distance from STEE (km)
Exploration and Option Area						
524	DEME Building Materials Ltd	Thames D	Exploration and Option Area	1.7	8.5	0.0
1809	Volker Dredging Ltd	East Orford Ness	Exploration and Option Area	7.4	12.1	5.5
1802	Aggregate Industries UK Ltd	North Falls	Exploration and Option Area	7.2	13.2	0.0
528/2	Hanson Aggregates Marine Ltd	Outer OTE	Exploration and Option Area	25.1	14.0	0.0
Production Areas						
509/1	Tarmac Marine Ltd	Longsand	Production Area*	33.7	0.1	0.0
509/2	Tarmac Marine Ltd	Longsand	Production Area	34.5	1.6	0.0
510/2	CEMEX Marine Ltd	Longsand	Production Area	22.3	3.5	0.0
509/3	Tarmac Marine Ltd	Longsand	Production Area	26.8	5.8	0.0
510/1	CEMEX Marine Ltd	Longsand	Production Area	26.8	5.8	0.0
508	Britannia Aggregates Ltd	Longsand	Production Area	26.8	5.8	0.0
507/1	CEMEX Marine Ltd	Shipwash	Production Area	25.0	9.6	0.0
507/4	CEMEX Marine Ltd	Shipwash	Production Area*	20.5	12.9	0.0



Licence Area	Operator	Area Name	Status	Distance from array area (km)	Distance from offshore ECC (km)	Distance from STEE (km)
498	Britannia Aggregates / Volker Dredging Ltd	North Inner Gabbard	Production Area	11.1	15.6	8.0
501	Westminster Gravels Ltd	North Falls East	Production Area	10.6	16.9	6.6
507/6	CEMEX Marine Ltd	Shipwash	Production Area*	15.1	17.2	2.2
507/5	CEMEX Marine Ltd	Shipwash	Production Area*	17.9	21.5	6.2

12.7.13 There is no direct overlap with the VE array and ECC, although Area 509/1 is immediately adjacent to the RLB for the ECC, therefore within the Direct Impacts Study Area, as shown in Figure 12.5. As outlined in Table 12.2, VE OWFL have agreed in-principle with Tarmac Marine Ltd that there are no issues despite the close proximity of their licensed aggregate areas. VE OWFL is currently engaging with other aggregate operators in the area through the Navigational Risk Assessment (NRA) process and other consultation as outlined in Volume 2, Chapter 9: Shipping and Navigation.

MILITARY AREAS

12.7.14 A summary of relevant MoD activities and areas is presented within this section, with further information provided in Volume 2, Chapter 9: Shipping and Navigation and Volume 2, Chapter 13: Military and Civil Aviation. The largest Zol for all impacts considered on subsea cables (see Paragraph 12.4.13) is the Traffic Study Area, as shown in Figure 12.1.

12.7.15 As shown in Figure 12.6, the array areas overlap with the North Galloper (X5121) Navy PEXA, with the entirety of the southern array and most of the northern array within the PEXA. In addition, the ECC overlaps the North Galloper (X5121), Outer Gabbard (X5117) and Gunfleet (X5118) PEXAs, with the South Galloper (X5120) and Kentish Knock (X5119) PEXAs located to the south.

12.7.16 All areas are used for practicing mine laying and sweeping and there are no areas designated as submarine exercise areas within the vicinity of the I&OMU study area. The nearest live firing area – Shoeburyness Range Sea Danger Area – is located 11.8 km south of the ECC and is therefore outwith the potential Zol of VE.

12.7.17 VE OWFL have consulted with the MoD and no concerns with the offshore AoS crossing the PEXA were raised.



UXO DISPOSAL AND RISK AREAS

12.7.18 The possibility of unexploded ordnance (UXO) and munitions in the marine environment includes items such as sunken sea mines, air delivered bombs and naval ammunition. Confirmed munitions have been encountered as part of construction of the Greater Gabbard and Galloper OWF, therefore it is considered that there is potential for UXO to be present in the VE study area. Two explosive dumping areas have also been identified:

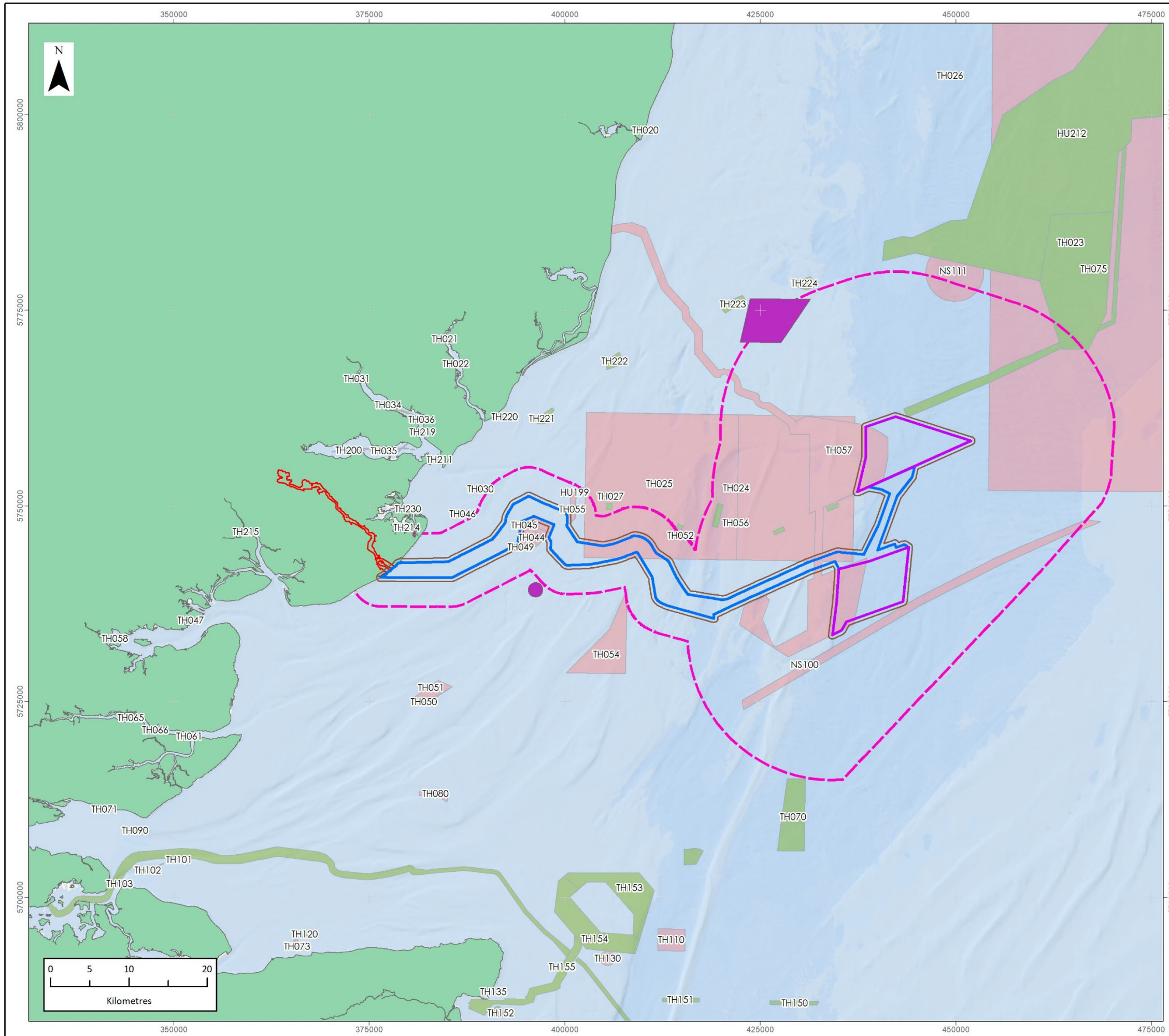
- > East Swin (Kings Channel): a disused designated explosives dumping ground located in the eastern part of the Gunfleet (X5118) PEXA, 6 km from the ECC.
- > East of Orford Ness: a disused designated explosives dumping ground located approximately 14 km to the northeast of the northern array area.

12.7.19 As outlined in Volume 2, Chapter 1: Offshore Project Description, the presence of UXO poses a health and safety risk where it coincides with the planned locations of infrastructure and vessel activity. Detailed pre-construction surveys will be completed post-consent in order to determine the precise nature of the seabed, including the locations and nature of UXO requiring clearance. As these surveys have not yet been completed, it is not possible at this time to determine how many items of UXO will require clearance. VE OWFL will apply for a separate Marine Licence post-consent for the clearance (if required) of any UXO identified.

12.7.20 In order to define the design envelope for the consideration of UXO within the EIA, a review of recent information has been undertaken, in conjunction with experience from nearby offshore wind farms (including Galloper and Greater Gabbard).

MARINE STRUCTURES

12.7.21 HM Fort Roughs, also known as Roughs Tower, is an offshore platform located approximately 12 km offshore, within the offshore ECC (as shown on Figure 12.3). Since 1967, the decommissioned Roughs Tower has been occupied and claimed as a sovereign state, known as the Principality of Sealand. The structure is located within UK territorial waters and is currently not recognised as a principality. From available information there is no indication that this structure is a designated Scheduled Monument or is otherwise listed.



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Red Line Boundary
- Explosives Dumping Area

Disposal Sites:

- Closed
- Disused
- Open

Data Source:
 Basemap: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:
 FIVE ESTUARIES OFFSHORE WINDFARM

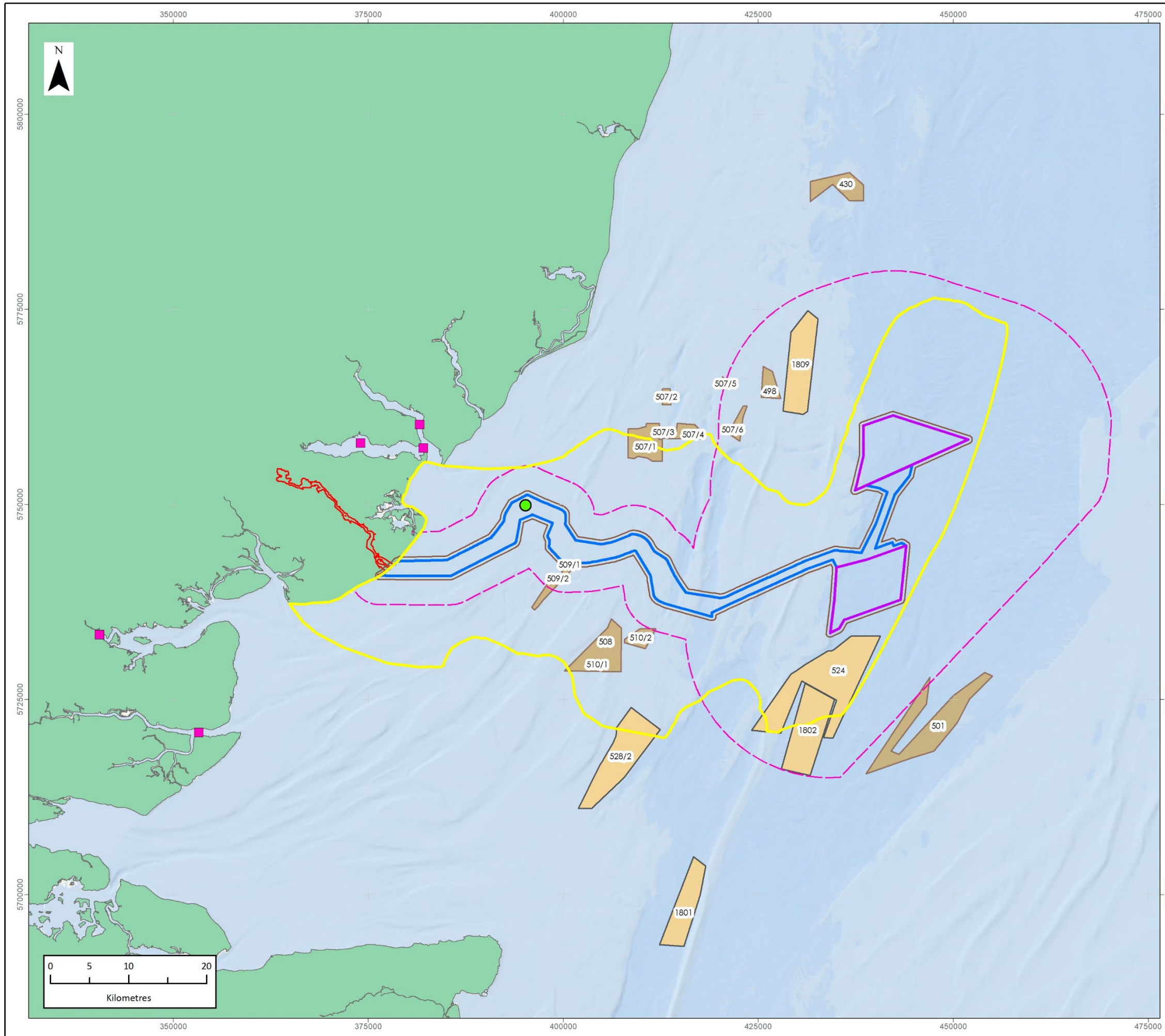
DRAWING TITLE:
 Marine Disposal Areas

VER	DATE	REMARKS	Drawn	Checked
1	22/02/2023	For Issue	SWM	AK

DRAWING NUMBER:
 12.4

SCALE: 1:500,000 PLOT SIZE: A3 DATUM: WGS84 PROJECTION: UTM31N





LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Red Line Boundary
- Spring Tidal Excursion Ellipse (STEE) Study Area
- Traffic Study Area
- Direct Impacts Study Area

Aggregates Areas:

- Exploration and Option Area
- Production Agreement Area
- Dredging Sites
- Sealand (Offshore Platform)

Data Source:
 Basemap: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:
 FIVE ESTUARIES OFFSHORE WINDFARM

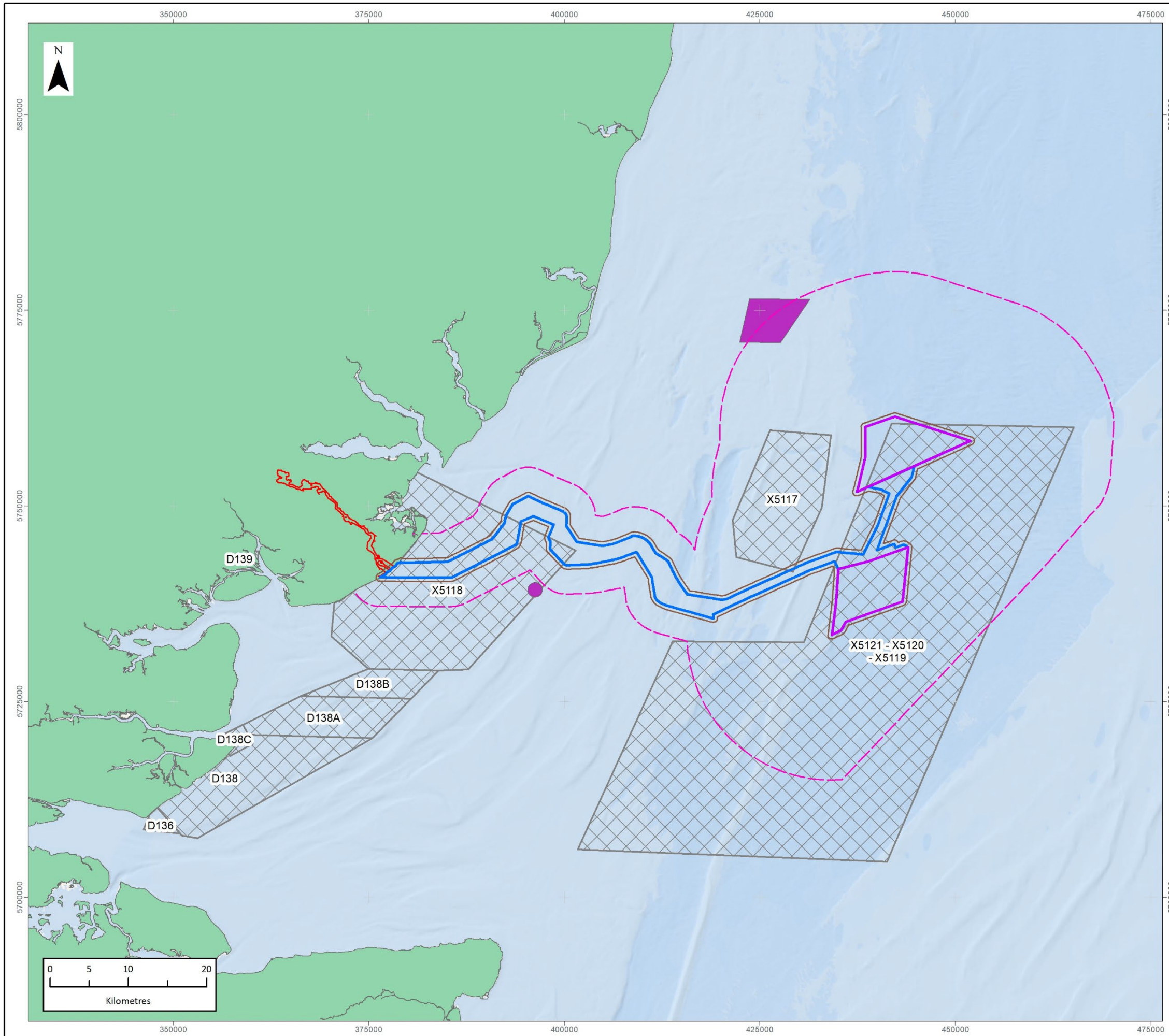
DRAWING TITLE:
 Marine Aggregate and Dredging Areas

VER	DATE	REMARKS	Drawn	Checked
1	22/02/2023	For Issue	SWM	AK

DRAWING NUMBER:
 12.5

SCALE: 1:500,000 PLOT SIZE: A3 DATUM: WGS84 PROJECTION: UTM31N





LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Red Line Boundary
- Spring Tidal Excursion Ellipse (STEE) Study Area
- Traffic Study Area
- Direct Impacts Study Area
- PEXA Areas
- Explosives Dumping Area

Data Source:
 Basemap: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:
 FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:
 Military Areas

VER	DATE	REMARKS	Drawn	Checked
1	22/02/2023	For Issue	SWM	AK

DRAWING NUMBER:
 12.6

SCALE: 1:500,000	PLOT SIZE: A3	DATUM: WGS84	PROJECTION: UTM31N
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EVOLUTION OF THE BASELINE

- 12.7.22 Proposed infrastructure has been outlined within the current baseline in the relevant receptor section where there is a high level of certainty or information available, including where infrastructure is already under construction or where a planning application has been approved or is awaiting decision (Tier 1 as set out in Volume 1, Annex 3.1: Cumulative Effects Assessment Methodology, and outlined here in Table 12.15). This includes, for example, the NeuConnect Interconnector outlined in Paragraph 12.7.8. This is to ensure that all potential receptors, including those that are not yet in construction, are included in the assessment where a reasonably high level of certainty is available. This is in line with guidance provided within PINS Advice Note 17 (PINS, 2019).
- 12.7.23 Proposed infrastructure with lower levels of certainty or information available, for example developments where a Scoping Report has been submitted or no planning application has been submitted (Tier 2 and Tier 3 as set out in Volume 1, Annex 3.1: Cumulative Effects Assessment Methodology, and outlined here in Table 12.15), has not been outlined within the current baseline. Infrastructure of this type includes:
- > The Greater Gabbard Extension, known as North Falls OWF. A Scoping Report is currently available on the PINS website. Spatial interactions between the North Falls OWF scoping boundary for the proposed cable corridor and the VE offshore ECC are presented in Figure 12.2.
 - > The South and East Anglia link (Sea Link) cable, which will connect Suffolk and Kent (National Grid, 2022). The Sea Link geophysical survey area, available from the MMO's marine licensing public register, is presented in Figure 12.3, in the absence of any specific route options.
 - > The Nautilus Multi-Purpose Interconnector (MPI), a 1.4 GW HVDC cable to connect the UK and Belgium (National Grid, 2021). This project is in the early planning stages and is anticipated to make landfall between Sizewell and Thorpeness. The search area for the proposed route for the Nautilus interconnector, shown in Figure 12.3, encapsulates the VE northern and southern array areas and approximately 35.8% of the ECC. The Nautilus Interconnector has been classified as an NSIP and will be required to submit a DCO Application.
 - > The Tarchon Energy Interconnector, proposed to connect the UK and Germany. This project is in the early planning stages and has made an application to the Gas and Electricity Markets Authority for an electricity interconnector licence.
- 12.7.24 Due to the lack of available information, the effects of these developments are not able to be fully determined and therefore will not be assessed within the current baseline at this stage, and therefore not considered as receptors for the project-alone assessment. The collation of baseline information and use across the study area is ongoing and proposed developments may be incorporated into future assessments as more information becomes available.
- 12.7.25 As indicated in the current baseline, there are a number of marine aggregate dredging areas in proximity to VE. In the future these areas may be surrendered, or new marine aggregate dredging areas may be designated. Given that there is a lack of publicly available information on future changes to the marine aggregate dredging environment, no changes are considered in the future baseline.



12.8 KEY PARAMETERS FOR ASSESSMENT

- 12.8.1 Assessing using a parameter-based design envelope approach means that the assessment considers a maximum design scenario whilst allowing the flexibility to make improvements in the future in ways that cannot be predicted at the time of submission of the DCO Application. The assessment of the maximum adverse scenario for each receptor establishes the maximum potential adverse impact and as a result impacts of greater adverse significance should not arise should any other development scenario (as described in Volume 2, Chapter 1: Offshore Project Description) to that assessed within this chapter be taken forward in the final scheme design.
- 12.8.2 The maximum assessment assumptions, referred to as the Maximum Design Scenario (MDS), that have been identified to be relevant to I&OMU are outlined in Table 12.12 below and are in line with the Project Design Envelope (Volume 2, Chapter 1: Offshore Project Description).

Table 12.12: MDS for the project alone.

Potential effect	Maximum adverse scenario assessed	Justification
Construction		
Impact 1: Activity or access displacement associated with increased vessel movements and the use of safety zones during construction activities	<p>WTG and OSP foundation installation vessels: 38 peak vessels (1359 round trips)</p> <p>WTG installation vessels: 15 peak vessels (71 round trips)</p> <p>OSP topside installation vessels: 4 peak vessels (8 round trips)</p> <p>Other installation vessels: 20 peak vessels (2,430 round trips)</p> <p>Offshore export cable installation vessels: 12 peak vessels (1,076 round trips)</p> <p>Array cable installation vessels: 12 peak vessels (166 round trips)</p>	<p>The maximum adverse scenario for vessel traffic is associated with the peak numbers of vessels during the construction phase and the number of round trips between port and site.</p> <p>The maximum adverse scenario for activity or access displacement is associated with the use of temporary 500 m safety zones around construction works throughout the maximum extent of the proposed works.</p>



Potential effect	Maximum adverse scenario assessed	Justification
	<p>Maximum total construction vessels:</p> <p>101 peak vessels (5,110 round trips)</p> <p>Indicative peak vessels on-site simultaneously: 35</p> <p>Array area:</p> <p>Buoyed construction area deployed around the maximum extent of the array area.</p> <p>Implementation of 500 m radius construction safety zones.</p> <p>Maximum array cable length of 200 km.</p> <p>Maximum offshore export cable length of 370 km.</p>	
<p>Impact 2: Temporary increases in Suspended Sediment Concentrations (SSCs) and subsequent deposition</p>	<p>Sandwave clearance:</p> <p>Total volume of sediment disturbed by sandwave clearance = 99,750,000 m³.</p> <p>WTG foundations:</p> <p>Seabed preparation spoil volume for all foundations = 1,193,600 m³.</p> <p>Export cable installation:</p> <p>Total volume of sediment disturbed by cable installation = 2,156,175 m³.</p> <p>Array cable installation:</p> <p>Total volume of sediment disturbed by cable installation = 3,150,000 m³.</p> <p>Total volume = 106,249,775 m³</p>	<p>The maximum adverse scenario for foundation installation results from dredging for seabed preparation prior to foundation installation (79 gravity base jacket foundation and 2 OSP gravity based foundations) and drilling as part of foundation installation (79 WTG + 2 OSP monopile foundations) both with the maximum number of foundations (79). For cable installation, the maximum adverse scenario results from the greatest volume from sandwave clearance and installation. This also assumes the largest number of cables and the greatest burial depth.</p>



Potential effect	Maximum adverse scenario assessed	Justification
<p>Impact 3: Direct disturbance and damage to existing assets and infrastructure</p>	<p>Buoyed construction area deployed around the maximum extent of the array area.</p> <p>Implementation of up to 500 m radius construction safety zones.</p> <p>Maximum array cable length of 200 km.</p> <p>Maximum offshore export cable length of 370 km.</p> <p>UXO clearance:</p> <p>Expected total number of potential UXO targets = 2,000.</p> <p>Expected number of UXO requiring clearance in the pre-construction phase = 60.</p>	<p>The maximum adverse scenario for direct disturbance and damage to existing assets is associated with the maximum extent of the proposed works.</p> <p>The maximum adverse scenario for UXO clearance is based off a review of recent information, in conjunction with experience from nearby offshore wind farms (including Galloper and Greater Gabbard).</p>
<p>Operation</p>		
<p>Impact 4: Activity or access displacement associated with increased vessel movements and the use of safety zones during operational and maintenance activities</p>	<p>Maximum design scenario is identical (or less) to that of construction phase.</p> <p>Total O&M Vessels:</p> <p>27 (1,776 annual round trips)</p> <p>Indicative peak vessels on-site simultaneously: 27</p>	<p>Operation and maintenance vessels will require fewer vessels and fewer return trips than the construction phase.</p> <p>Temporary 500 m safety zones may be required for infrastructure that is undergoing major maintenance (for example WTG blade replacement).</p>
<p>Impact 5: Physical presence of infrastructure</p>	<p>WTGs:</p> <p>79 smaller WTGs</p> <p>OSPs:</p> <p>2 OSPs</p> <p>Cables:</p> <p>Maximum array cable length of 200 km.</p>	<p>The maximum potential physical presence of infrastructure will be from the installation of the maximum number of WTGs and OSPs.</p>



Potential effect	Maximum adverse scenario assessed	Justification
	Maximum offshore export cable length of 370 km. Total volume of cable protection required = 1,155,000 m ³	
Decommissioning		
Impact 6: Activity or access displacement associated with increased vessel movements and the use of safety zones during decommissioning activities	Maximum design scenario is identical (or less) to that of construction phase.	This will result in the maximum potential vessel disturbance. The maximum adverse scenario for activity or access displacement is associated with the use of temporary 500 m safety zones around decommissioning works throughout the maximum extent of the proposed works.
Impact 7: Temporary increases in SSCs and subsequent deposition	Maximum design scenario is identical (or less) to that of construction phase.	WTGs will be removed by reversing the methods used to install them. Certain components may be left <i>in situ</i> instead of removed. The area of seabed impacted during the removal of the WTGs will be the same as the area impacted during installation. The OSPs will be a reverse installation. The area of the seabed disturbed by decommissioning activities will be the same area impacted during installation. Certain components may be left <i>in situ</i> instead of removed. It is likely that equipment similar to that which is used to install the cables could be used to reverse the burial process and expose them. Therefore, the area of seabed impacted during the removal of the cables could be the same



Potential effect	Maximum adverse scenario assessed	Justification
		as the area impacted during the installation of the cables.
Impact 8: Direct disturbance and damage to existing assets and infrastructure	Maximum design scenario is identical (or less) to that of construction phase.	The maximum adverse scenario for direct disturbance and damage to existing assets is associated with the maximum extent of the proposed works.

12.9 EMBEDDED MITIGATION

- 12.9.1 As part of the VE design process, a number of embedded mitigation measures have been adopted to reduce the potential for impacts on I&OMU. These mitigation measures will evolve over the development process as the EIA progresses and in response to consultation. They will be fed iteratively into the assessment process.
- 12.9.2 These measures typically include those that have been identified as good or standard practice and include actions that would be undertaken to meet existing legislation requirements. As there is a commitment to implementing these mitigation measures, and also to various standard sectoral practices and procedures, they are considered inherently part of the design of VE and are set out in this PEIR. Table 12.13 sets out the relevant mitigation measures within the design and how these affect the I&OMU assessment.
- 12.9.3 The embedded mitigation contained in Table 12.13 are mitigation measures or commitments that have been identified and adopted as part of the evolution of the project design of relevance to the topic, these include project design measures, compliance with elements of good practice and use of standard protocols.

Table 12.13: Embedded mitigation relating to I&OMU.

Project phase	Mitigation measures embedded into the project design
General	
Project design	The development boundary selection was made following a series of constraints analyses, with the Array Area and offshore ECC selected to ensure the impacts on the environment and I&OMUs are minimised as far as reasonably practical.
Project design	VE will be designed and constructed to satisfy the requirements of the CAA, MCA and Trinity House Lighthouse Service (THLS) in respect of aids to navigation, lighting and marking.
Marine coordination for project vessels	Marine coordination will be implemented to manage project vessels including a Traffic Management Plan.



Project phase	Mitigation measures embedded into the project design
Cable Specification and Installation Plan (CSIP)	Development of, and adherence to, a Cable Specification and Installation Plan (CSIP) post consent. The CSIP will set out appropriate cable burial depth in accordance with industry good practice, minimising the risk of cable exposure. The CSIP will also ensure that cable crossings are appropriately designed to mitigate environmental effects, these crossings will be agreed with relevant parties in advance of CSIP submission. The CSIP will include a detailed Cable Burial Risk Assessment (CBRA) to enable informed judgements regarding burial depth whilst limiting the amount of sediment disturbance to that which is necessary. The CSIP will be conditioned in the deemed Marine Licence.
Promulgation of information	Advance warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notices to Mariners (NtM) and Kingfisher Bulletins and supplemented with VHF (very high frequency) radio broadcasts agreed with the Maritime & Coastguard Agency (MCA) in accordance with the construction and monitoring programme approved under deemed marine licence condition.
Construction	
Project design	Crossing and proximity agreements with known existing and proposed pipeline and cables operators will be sought.
Project design	Horizontal Directional Drill (HDD) technique will be used at the landfall location.
Application for Safety Zones	VE OWFL will apply for safety zones post consent including up to 500 m around ongoing activities during construction and up to 50 m for installed structures pre commissioning. Where appropriate, guard vessels will also be used to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation.
Promulgation of information	VE OWFL will ensure that local NtM and Kingfisher Bulletins are updated and reissued at weekly intervals during construction.
Operation	
Application for Safety Zones	An application will be made for safety zones post consent including up to 500 m around ongoing activities during major maintenance. Where appropriate, guard vessels will also be used to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation.



Project phase	Mitigation measures embedded into the project design
Promulgation of information	OWFL will ensure that local NtM and Kingfisher Bulletins are updated and reissued at least five days prior to planned maintenance works.
Decommissioning	
Decommissioning Programme	A Decommissioning Programme will be developed to cover the decommissioning phase as required under Chapter 3 of the Energy Act 2004. As the decommissioning phase will be a similar process to the construction phase but in reverse (i.e., increased project vessels on-site, partially deconstructed structures) the embedded mitigation measure will be similar to those for the construction phase. The Decommissioning Plan will be secured as a condition in the deemed Marine Licence.
Application for Safety Zones	An application will be made for safety zones prior to decommissioning including up to 500 m around ongoing activities during decommissioning and up to 50 m for installed structures pre decommissioning. Where appropriate, guard vessels will also be used to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation.
Promulgation of information	VE OWFL will ensure that local NtM and Kingfisher Bulletins are updated and reissued at weekly intervals during decommissioning.

12.10 ENVIRONMENTAL ASSESSMENT: CONSTRUCTION PHASE

IMPACT 1: ACTIVITY OR ACCESS DISPLACEMENT ASSOCIATED WITH INCREASED VESSEL MOVEMENTS AND THE USE OF SAFETY ZONES DURING CONSTRUCTION ACTIVITIES

OVERVIEW

12.10.1 The construction of VE will increase vessel movements within the area by a maximum of 5,110 return trips (as per identified in Table 12.12) over the 5-year construction period from the seabed preparation works (for example sandwave clearing and boulder clearance, should they be required) and the installation of infrastructure (WTGs, OSPs and cables (inter-array and export)). As described in Volume 2, Chapter 1: Offshore Project Description, the construction of VE will include a maximum of 79 WTGS, associated inter-array cables with a total length of 200 km, a maximum of 2 OSPs and a maximum of four export cable circuits with a total length of 370 km.



- 12.10.2 During the construction of each part of the wind farm infrastructure listed above, there will be 500 m safety zones in order to maintain safety of other marine users and the construction site, as outlined in Table 12.13. Guard vessels will also be used where appropriate to ensure that adherence to these safety zones is kept in order to minimize risks to surface navigation. Both increased vessel movements and the associated safety zones may result in activity or access displacement to I&OMU receptors in the vicinity of VE.
- 12.10.3 The largest study area for this potential impact is the Traffic Study Area (see Paragraph 12.4.13 and Figure 12.1), associated with increased vessel movements. Displacement from the use of 500 m safety zones will impact on receptors within the Direct Impacts Study Area (see 12.4.13 and Figure 12.1). The worst-case scenario for this impact assumes that Tier 1 (see Table 12.14) developments within the study area, such as the NeuConnect Interconnector, will have overlapping construction period to VE. Infrastructure and assets that may be affected include:
- > OWFs: Galloper, Greater Gabbard, East Anglia TWO, and North Falls (see Figure 12.2).
 - > Subsea cables: Concerto 1S, Farland, BritNed, and NeuConnect (see Figure 12.3)
 - > Marine disposal: Inner Gabbard East (TH056) and East Anglia One (TH023) (see Figure 12.4).
 - > Marine aggregate areas: Exploration and Option Areas 524, 1809, and 1802; and Production Areas 509/1, 509/2, 510/2, 498, 501, 507/4 and 507/6 (see Figure 12.5).
 - > Military areas: North Galloper (X5121), South Galloper (X120), Kentish Knock (X5119), Outer Gabbard (X5117), and Gunfleet (X5118) (see Figure 12.6).
- 12.10.4 The larger installation vessels (such as jack-up vessels), transport barges and cable laying vessels are likely to transit directly to the site from their homeports, or from construction ports (WTGs, cable, foundation etc.). The vessels likely to operate out of a local UK harbour are likely to be the smaller vessels, such as Crew Transfer Vessels (CTVs).
- 12.10.5 The construction vessels will be required to deploy a number of embedded environmental measures that are listed in Table 12.13. Those that are relevant to vessel movements are:
- > The production and promulgation of advanced warning and information including construction vessel routes, locations, dates, and associated safety zones via NtM and Kingfisher Bulletins;
 - > The development of a Traffic Management Plan (TMP);
 - > Safety zones (500 m) around wind farm construction activities and advisory safety zones around cable installation; and
 - > Regular updates to the NtM and supplemental VHF broadcast agreed with MCA to ensure all parties are updated on planned works and locations of activities.



MAGNITUDE OF IMPACT

- 12.10.6 Increased vessel numbers could lead to minor route changes being required for other vessel activities in the area. These could include maintenance vessel activities for OWFs and subsea cables, as well as vessels engaged in disposal, aggregate dredging, and military practice operations. These impacts will be of local extent, short-term duration, and are reversible, therefore representing only a very slight change from baseline conditions. In addition, these impacts will be subject to additional controls such as NtM and a TMP (as outlined in Table 12.13) which will ensure any risks of collision or disturbance impacts are appropriately managed. The magnitude of this impact is therefore considered to be **negligible**.
- 12.10.7 The presence of safety zones (500 m) and advisory safety zones may restrict access to other infrastructure within the vicinity of VE. This could prevent maintenance activities from being carried out, for example on OWFs and subsea cables, as well as construction activities for some assets including the NeuConnect Interconnector.
- 12.10.8 In terms of OWFs, this would potentially affect the maintenance activities on the already constructed Galloper, Greater Gabbard, and East Anglia TWO OWFs. Controls and notifications of works that will be applied to the VE construction vessel activity (outlined in Table 12.13 and Paragraph 12.10.6) will ensure any risks of collision or disturbance impacts are appropriately managed, limiting the potential magnitude of any impact. Impacts on other OWFs will therefore be of small physical extent, short-term duration, reversible, and avoidable through commercial agreements and mitigation, representing only a very slight change from baseline conditions. The magnitude of this impact on OWFs has therefore been considered to be **negligible**.
- 12.10.9 Although the Concerto 1S and Farland subsea cables cross the northern array area, discussions are ongoing with the asset owners with regards to proximity and crossings, meaning that safety zones around foundations would not inhibit maintenance activities on the cables. The BritNed Interconnector is similarly located circa 1 km from the nearest WTG in the southern array. The greatest potential for impact is expected to arise for the NeuConnect Interconnector, which is currently proposed to route through the VE northern array. The exact route has not been confirmed and therefore may pass within 1 km from the nearest WTGs, meaning 500 m safety zones around these assets may potentially conflict with each other. Mitigation will be put in place, including commercial and technical agreements, in order to prevent risks to this asset. Impacts on existing subsea cables in the Direct Impacts Study Area are therefore spatially limited, of short-term duration, intermittent, and reversible, and have therefore been considered to be of **low** magnitude for the existing subsea cables and **medium** magnitude for the NeuConnect Interconnector.
- 12.10.10 The presence of safety zones may also restrict operations at disposal sites, aggregate dredging areas, and military PEXA. There are no active disposal sites located within 5 km of the VE RLB, meaning that the presence of safety zones around construction activities will not impact on access to these sites, other than the potential for small changes in vessel routing to and from disposal sites located further away from the RLB. This impact will therefore be spatially limited, of short-term duration, intermittent, and reversible, representing only a very slight change from baseline conditions and therefore considered to be **negligible**.



- 12.10.11 The presence of safety zones may constrain dredger access to aggregate resources from the need to respect the safe working separation distance from VE construction works. The majority of licensed aggregate areas in the areas are >1 km away from the RLB and therefore the implementation of safety zones will not affect activities at these sites. For area 509/1, which borders the RLB for the ECC (see Table 12.13 and Figure 12.5), additional controls and notifications that will be applied to the VE construction vessel activity (as outlined in Table 12.13) will ensure any potential for access or dredging activity displacement can be appropriately managed to minimize any potential for conflict or constraint on operations. This impact, being applicable only to potential works undertaken within the boundary of area 509/1, will be very limited in spatial extent, of short-term duration, intermittent, and reversible, as well as avoidable through mitigation. It will therefore represent only a very slight change from baseline conditions and is considered to be **negligible**.
- 12.10.12 The VE array areas overlap with the North Galloper (X5121) Navy PEXA, with the ECC overlapping three further PEXAs as outlined previously in paragraph 12.7.14. Impacts on activities in this area will be spatially localised and of short-term duration, although due to the nature of the activity occurring it may be moderately reduced during this time. Additional controls and notifications of works applied to VE construction vessel activity (as outlined in Table 12.13) will ensure any risks of disruption are appropriately managed. In addition, the Application will engage in ongoing consultation and communication with the MoD to ensure that risks are appropriately managed. The magnitude of impact from the presence of temporary safety zones is therefore considered to be **low**.

SENSITIVITY OR VALUE OF RECEPTOR

- 12.10.13 Existing windfarms in the area, particularly Galloper, Greater Gabbard, and East Anglia TWO (once constructed) may be sensitive to potential interruption to operational and maintenance activities, as well as construction activities for the North Falls OWF. These assets only overlap with the predicted extent of safety zones (the Direct Impacts Study Area) in a relatively small area between the northern and southern array areas for the identified OWFs. VE OWFL will continue to engage with the operators of these assets in order to manage these potential risks. Additionally, impacts will be mitigated through the use of a TMP and advanced warning of construction activities through NtM (as outlined in Table 12.13), therefore ensuring potential impacts are appropriately managed. OWF receptors are considered to be of medium value, with reasonable economic contribution to the regional economy, but are not generally vulnerable to potential impacts due to the mitigation outlined above. The sensitivity of the OWF receptors to activity and access displacement is therefore considered to be **low**.



- 12.10.14 Impacts may arise from any interruption of maintenance or construction activities for the relevant subsea cables. This includes the NeuConnect Interconnector, which is anticipated to have been constructed by this time although the construction period could overlap with that of VE in the case of unexpected delays. The NeuConnect Interconnector is currently proposed to route through the VE northern array and may pass within 1 km of the nearest WTGs, meaning safety zones around these assets may potentially conflict with each other. The potential for disruption will be mitigated through the management of vessel movements via the TMP and advanced warning of construction works through NtM (as identified in Table 12.13), therefore ensuring potential impacts are appropriately managed. Subsea cable receptors are considered to be of high value, but low vulnerability and high recoverability due to the mitigation outlined above. The sensitivity of subsea cable receptors to activity and access displacement is therefore considered to be **low**.
- 12.10.15 As a result of the separation distance of all active disposal sites from the VE RLB (>5 km), it is unlikely that operations at these locations could be affected by the implementation of safety zones around construction works. Minor vessel routing changes may be required due to increase vessel movements and the presence of these safety zones, however this will be minimized through the managements of vessel movements via the TMP and advanced warning of construction works through NtM (as identified in Table 12.13). Marine disposal areas are considered to be of minor value, negligible vulnerability and high recoverability due to the mitigation outlined above. The sensitivity of marine disposal receptors to activity and access displacement is therefore considered to be **negligible**.
- 12.10.16 Impacts are expected to occur in the form of interruptions to the normal routes and navigational passages used by aggregate extraction vessels, due to increased vessel movements and the implementation of safety zones around construction activity. This may lead to exclusion to small areas of aggregate resources. The impact is expected to be greatest at the Area 509/1 licensed extraction area due to its proximity to the RLB (see Figure 12.5). VE OWFL will have ongoing engagement with Tarmac Marine Ltd, the operator of the site, to discuss and agree appropriate measures to ensure that no conflicts arise, and they have agreed in-principle that there are no issues despite the proximity of the site. Marine aggregate areas are considered to be of medium value, low vulnerability, and high recoverability, and the sensitivity to activity and access displacement is therefore considered to be **low**.
- 12.10.17 Military activities could be disrupted by impacts from increased vessel movements and the presence of safety zones. The greatest impact is expected to be on the North Galloper (X5121) Royal Navy PEXA which is used for practicing mine laying and sweeping. VE OWFL will have ongoing consultation and communication with the MoD to ensure that there will be no conflict between VE construction activity and the military activities and there are a number of embedded mitigation measures that will be deployed such as promulgation of information (as identified in Table 12.13). It is likely that the construction activities will be taken into consideration by the MoD during exercise planning. Military areas are considered to be of high value, low vulnerability, and high recoverability, and the sensitivity to activity and access displacement is therefore considered to be **negligible**.



SIGNIFICANCE OF RESIDUAL EFFECT

12.10.18 Based on the assessments of receptor sensitivity and impact magnitude made above, the significance of residual effect on I&OMU receptors is considered as follows:

- > It is predicted that the sensitivity of OWFs is **low**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.
- > It is predicted that the sensitivity of subsea cables is **low**, and the magnitude of the impact is **low** for existing subsea cables, and **medium** for the NeuConnect Interconnector. Therefore, the effect will be of **minor adverse** significance, which is not significant in EIA terms.
- > It is predicted that the sensitivity of marine disposal sites is **negligible**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.
- > It is predicted that the sensitivity of marine aggregate sites is **low**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.
- > It is predicted that the sensitivity of military areas is **negligible**, and the magnitude of the impact is **low**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.

IMPACT 2: TEMPORARY INCREASES IN SSC AND SUBSEQUENT DEPOSITION

12.10.19 Seabed preparation for sandwave clearance, cable trenching (for array and export cables), drilling for foundations and spoil dispersal are all predicted to cause sediment plumes. These temporary localized increases in SSC and the associated sediment deposition are expected from seabed preparation works (such as sandwave and boulder clearance) and foundation and cable installation works. Volume 2, Chapter 2: Marine Geology, Oceanography and Physical processes and Volume 4, Annex 2.2: Physical Processes Technical Assessment provides a full description of the offshore physical environmental assessment, with a summary of the maximum design scenario associated with the impact, as identified in Table 12.12 of this chapter.

12.10.20 The study area for this potential impact is the STEE (see Paragraph 12.4.13 and Figure 12.1). Infrastructure and assets that may be affected include:

- > OWFs: Galloper, Greater Gabbard, East Anglia Two, North Falls, and Gunfleet Sands 1 and 2 (see Figure 12.2).
- > Subsea cables: Concerto 1S, Farland, BritNed, and NeuConnect (see Figure 12.3).
- > Marine disposal: TH027, TH052, TH056 (see Figure 12.4).
- > Marine aggregate areas: Exploration and Option Areas 524, 1802, and 528/2; and Production Areas 509/1, 509/2, 510/2, 510/1, 508, 507/1 (see Figure 12.5).

12.10.21 The worst-case scenario for this impact assumes that Tier 1 (see Table 12.14) developments within the study area, such as the NeuConnect Interconnector, have been constructed prior to VE construction commencing.



MAGNITUDE OF IMPACT

- 12.10.22 Temporary increases to SSC could potentially result in increased sediment deposition on assets such as OWFs and subsea cables. This could lead to cable over-burial, which can compromise the power carrying capacity of the cable and potentially lead to damage due to overheating. As outlined in Volume 2, Chapter 2: Marine Geology, Oceanography and Physical processes, sands and gravels may be deposited within 0 to 50 m of active disturbance in local thicknesses of tens of centimetres up to several metres. This could potentially impact on cables within the VE RLB, including Concerto 1S, Farland, and NeuConnect, as well as the Galloper and Greater Gabbard export cables.
- 12.10.23 The VE array areas are characterized by the presence of mobile sediments, including sandwaves up to 12 m in height. This suggests a sufficiently energetic current regime to redistribute deposited sediment, as well as indicating that cables in this area already have variable overlying sediment thicknesses. Impacts on OWFs and subsea cables from sediment deposition will therefore be spatially limited, of short-term duration, intermittent, and reversible. They therefore represent only a very slight change from baseline conditions and have been considered as **negligible**.
- 12.10.24 Construction activities have the potential to cause changes to seabed composition and bathymetry due to potential increases in SSCs and associated sediment deposition. This has the potential impact on marine disposal sites by increasing the seabed level within those sites. As outlined in Volume 2, Chapter 2: Marine Geology, Oceanography and Physical processes, at distances greater than 500 m from construction activities there will be no measurable thickness of deposition. The magnitude of impact on marine disposal sites will therefore be of negligible physical extent and has therefore been considered as **negligible**.
- 12.10.25 Aggregate sites may also be impacted by sediment deposition causing changes to seabed composition and bathymetry. Area 509/1 is located 0.1 km from the RLB (see Figure 12.5). At this distance, there will be a notable SSC increase lasting for the duration of active disturbance as well as up to 30 minutes following the end of disturbance, with local sand and gravel deposition of up to tens of centimeters. Other areas within the STEE may be subject to a measurable SSC increase, mainly consisting of fines, and no measurable thickness of deposition. As the sediment deposited will have originated nearby, this will represent only a slight, localised increase in overall sediment thickness, with no potential to threaten the long-term viability of the site. The magnitude of the impact will therefore be short-term, intermittent and of localised extent, representing only a very slight change from baseline conditions, and is therefore considered to be **negligible**.



SENSITIVITY OR VALUE OF RECEPTOR

- 12.10.26 Impacts may arise from cable over-burial as a result of increased sediment deposition from construction activities. This could affect subsea cables within the VE RLB, including the inter-array and export cables of OWFs as well as power and telecommunications cables, primarily Concerto 1S, Farland, and NeuConnect. The Galloper and Greater Gabbard export cables are unlikely to be impacted as they will be protected with cable protection at the appropriate distances. Due to the presence of mobile sandwaves within the array area, cables in this area will already have variable overlying sediment thicknesses. These receptors are therefore considered to have low vulnerability and high recoverability, although they are of medium to high value. The sensitivity of OWFs and subsea cables to increased SSC and associated sediment deposition is therefore considered to be **low**.
- 12.10.27 Potential changes to seabed composition and bathymetry may also potentially affect the seabed level within marine disposal sites. There is sufficient distance between the RLB and most disposal sites that any increases in bed levels will be immeasurable in practice. Disposal sites and their users are deemed to be of low vulnerability, high recoverability and minor value and the sensitivity of this receptor is therefore considered to be **negligible**.
- 12.10.28 Impacts have the potential to arise as a result of potential changes to seabed composition and bathymetry, thus potentially affecting the seabed level within marine aggregate sites. The closest aggregate extraction area is Area 509/1 and therefore may be more affected by sediment deposited from cable installation activities. Ongoing consultation will take place with Tarmac Marine Ltd in order to mitigate any impacts, and they have agreed in-principle that there are no issues despite the proximity of the site. Marine aggregate sites are deemed to be of medium vulnerability, high recoverability and medium value. The sensitivity of marine aggregates to temporary increases in SSC is therefore considered to be **low**.

SIGNIFICANCE OF RESIDUAL EFFECT

- 12.10.29 Based on the assessments of receptor sensitivity and impact magnitude made above, the significance of residual effect on I&OMU receptors is considered as follows:
- > It is predicted that the sensitivity of OWFs is **low**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.
 - > It is predicted that the sensitivity of subsea cables is **low**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.
 - > It is predicted that the sensitivity of marine disposal sites is **negligible**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.
 - > It is predicted that the sensitivity of marine aggregate sites is **low**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.



IMPACT 3: DIRECT DISTURBANCE AND DAMAGE TO EXISTING ASSETS AND INFRASTRUCTURE

12.10.30 As described within Volume 2, Chapter 1: Offshore Project Description, it is anticipated that the construction of VE will include a range of activities including seabed preparation works, cable and foundation installation, and UXO clearance. These activities have the potential to directly disturb or damage existing infrastructure within the area. The worst-case scenario for this impact assumes that Tier 1 developments within the study area, such as the NeuConnect Interconnector, have been constructed prior to VE construction commencing.

12.10.31 The study area for this potential impact is the Direct Impacts Study Area (see Paragraph 12.4.13 and Figure 12.1). Infrastructure and assets that may be affected include:

- > OWFs: Galloper and Greater Gabbard (see Figure 12.2).
- > Subsea cables: Concerto 1S, Farland, BritNed, and NeuConnect (see Figure 12.3)
- > Marine structures: HM Fort Roughs (otherwise known as Roughs Tower, or Sealand) (see Figure 12.3).

MAGNITUDE OF IMPACT

12.10.32 As identified in Paragraph 12.7.1 there will be no physical overlap of other offshore wind farms with the VE array areas, however the VE ECC will cross the Galloper and Greater Gabbard export cables. Cable installation methods and cable crossings will be designed in accordance with a Cable Specification and Installation Plan (CSIP), which will be conditioned in the Marine Licence, as outlined in Table 12.13. VE OWFL will also enter into proximity and crossing agreements with the relevant cable operators. This agreement will determine how crossing are made and how close construction activities can be to the existing infrastructure, as well as containing detailed requirements for each crossing, including mitigation.

12.10.33 Crossing agreements will allow cable operators to access their infrastructure during the construction of VE as far as practicable, although 500 m construction safety zones will be required (as identified in Table 12.13 and discussed in Paragraph 12.10.2 *et seq.*). Crossing agreements will ensure close communication and planning between both parties to ensure disruption of activities is minimized, and that risks are reduced to acceptable levels. The final crossing design will be determined post-consent, in agreement with relevant operators. Impacts will be of local spatial extent and avoidable through the implementation of cable crossing agreements with cable operators and adherence to a CSIP. The magnitude of impacts will therefore represent only a slight change from baseline conditions and has therefore been considered to be **negligible**.



- 12.10.34 Construction activities such as the deployment of jack-up vessels, vessel anchoring, seabed preparation activities and the installation of cables and foundations can potentially damage other subsea cables, especially when carried out in proximity to other cables and at cable crossings. This may result in an efficiency in reduction, cable de-burial or potential failure of the assets. The greatest potential for impact is expected to arise for the NeuConnect Interconnector, which is currently proposed to route through the VE northern array although the exact route has not been finalised. As outlined below, mitigation will be put in place, including commercial and technical agreements, in order to identify and prevent risks to this asset.
- 12.10.35 A pre-construction survey will be carried out which will include geophysical and magnetometer surveys that will be able to identify existing assets, including out of service cables, which may be in a different position to their charted location because of past use of outdated locating techniques. Micrositing will be carried out where practicable and to minimize crossings and maintain a safe distance from existing assets. As outlined in Paragraph 12.10.32 *et seq.*, cable crossings will be designed in accordance with a CSIP, and VE OWFL will enter into proximity and crossing agreements with cable operators. The impact is predicted to be of local spatial extent, short-term duration, intermittent and avoidable through the implementation of commercial and technical agreements. The magnitude of impact is therefore considered to represent a slight change from baseline conditions and has therefore been considered to be **negligible**.
- 12.10.36 Construction activities within the cable corridor have the potential to disturb or damage marine structures such as Roughs Tower, particularly seabed preparation activities, the installation of cables, and UXO clearance. Direct impacts from construction vessels will be mitigated against by specific cable routing and the implementation of an appropriate buffer between the VE export cable and Roughs Tower. A communications strategy will be developed and implemented to ensure any individuals resident on the structure will be kept informed of planned works and any activities of specific concern. Appropriate controls will be implemented for UXO clearance should this be required following detailed pre-construction surveys. The impact is predicted to be of local spatial extent, short-term duration, intermittent and avoidable through the implementation of the mitigation outlined above, although the level of activity that may be undertaken may be reduced. The magnitude of impact is therefore considered to represent a very slight shift from baseline conditions and has therefore been considered to be **negligible**.

SENSITIVITY OR VALUE OF RECEPTOR

- 12.10.37 Construction activities including seabed preparation, vessel anchoring and cable laying have the potential to disturb or damage export cables for existing OWFs within the VE Direct Impacts Study Area. This could lead to efficiency reduction, cable de-burial or potential failure of the assets, which would be expensive to repair and has the potential to cause disruption to power distribution. Other windfarms in the area are therefore deemed to be of medium vulnerability, medium recoverability, and high value. The sensitivity of this receptor is therefore deemed to be **medium**.



12.10.38 Assets potentially at risk include the Concerto 1S, Farland, and NeuConnect Interconnector cables, as shown on Figure 12.3. Impacts from construction activities have the potential to disturb or damage existing subsea cables, which can lead to efficiency reduction, cable de-burial or potential failure of the assets. This damage would be expensive to repair and has the potential to cause disruption to power distribution and telecommunications. Active subsea cables in the vicinity of VE are therefore deemed to be of medium vulnerability, medium recoverability, and high value. The sensitivity of this receptor is therefore deemed to be **high**.

12.10.39 Impacts from construction activities have the potential to disturb or damage marine structures, notably Roughs Tower. The structure is understood to be inhabited, and damage to this asset could therefore potentially impact human health and cause reputational damage. This asset is therefore deemed to be of medium vulnerability, medium recoverability, and low value. The sensitivity of this receptor is therefore considered to be **medium**.

SIGNIFICANCE OF RESIDUAL EFFECT

12.10.40 Based on the assessments of receptor sensitivity and impact magnitude made above, the significance of residual effect on I&OMU receptors is considered as follows:

- > It is predicted that the sensitivity of OWFs is **medium**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **minor adverse** significance, which is not significant in EIA terms.
- > It is predicted that the sensitivity of subsea cables is **high**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **minor adverse** significance, which is not significant in EIA terms.
- > It is predicted that the sensitivity of marine structures is **medium**, and the magnitude of the impact is **low**. Therefore, the effect will be of **minor adverse** significance, which is not significant in EIA terms.

12.11 ENVIRONMENTAL ASSESSMENT: OPERATIONAL PHASE

12.11.1 As above, but in relation to operational phase impacts, and those associated with the maintenance of the project.

IMPACT 4: ACTIVITY OR ACCESS DISPLACEMENT ASSOCIATED WITH INCREASED VESSEL MOVEMENTS AND THE USE OF SAFETY ZONES DURING OPERATIONAL AND MAINTENANCE ACTIVITIES

12.11.2 Increases in vessel movements during the operational phase will be smaller than those for construction and are of lesser magnitude, as outlined in Table 12.12. The physical presence of temporary safety zones (500 m) during the operational phase, for example for maintenance purposes, will be of a lesser magnitude than those for construction.

12.11.3 The magnitude of impacts and the sensitivities of I&OMU receptors to this impact are described in detail in Paragraph 12.10.1 *et seq.* The largest study area for this potential impact is the Traffic Study Area, with the Direct Impacts Study Area considered for the use of safety zones (see 12.4.13 and Figure 12.1). Infrastructure and assets that may be affected are outlined in 12.10.3.

12.11.4 The magnitude of the impacts has been assessed as **negligible** to **low**, with the maximum sensitivity of the receptors being **medium**.



12.11.5 Mitigation will also be deployed during the operational phase of VE and is identified in Table 12.13, which includes advanced warning of maintenance operations and vessel routes and a TMP to be implemented. Therefore, the significance of effects from activity and access displacement occurring from the operational phase of VE will be of **minor adverse** significance at worst, which is not significant in EIA terms.

IMPACT 5: PHYSICAL PRESENCE OF INFRASTRUCTURE

12.11.6 As outlined in Table 12.12, the design parameters for VE state that up to 79 WTGs and two OSPs could be constructed.

12.11.7 The study area for this potential impact is the Direct Impacts Study Area (see Paragraph 12.4.13 and Figure 12.1). Infrastructure and assets that may be affected include:

- > OWFs: Galloper, Greater Gabbard, and North Falls (see Figure 12.2).
- > Subsea cables: Concerto 1S, Farland, BritNed, and NeuConnect (see Figure 12.3).
- > Marine disposal: None open (see Figure 12.4).
- > Marine aggregate areas: Area 509/1 (see Figure 12.5).
- > Military areas: North Galloper (X5121), Outer Gabbard (X5117), and Gunfleet (X5118) (see Figure 12.6).

12.11.8 VE will implement a number of embedded environmental measures during the operational phase (as detailed in Table 12.13), which includes the detailing of physical infrastructure on all navigational charts and maps. This infrastructure will also have the relevant lighting and marking in accordance with Trinity House (TH) and the (AtoN) and Lighthouse Authorities (IALA).

MAGNITUDE OF IMPACT

12.11.9 Repair or maintenance works required on existing OWF infrastructure, particularly export cables, and other subsea cables, may be required in the vicinity of VE during the operational phase. Restriction of access to an active cable for inspection and maintenance activities could be critical to the operation of that cable. However, pipeline and cable proximity agreements and crossings are common across the UK Continental Shelf (UKCS) and there are established mechanisms for controlling the level of impacts to both parties. The impact is predicted to be of local spatial extent, short-term duration, intermittent and avoidable through the implementation of the mitigation outlined above. As such, the magnitude of impact for OWFs and subsea cables is considered to be **negligible**.

12.11.10 The presence of submarine cables has the potential to compromise the safe operation of marine aggregate interests if routed too close. There is the potential for the VE export cable to present a danger to risk to aggregate areas located close by, notably Area 509/1. VE OWFL have agreed in-principle with Tarmac Marine Ltd that there are no issues despite the close proximity of this licensed aggregate area, and consultation will continue throughout the application process. The impact is predicted to be of local spatial extent, short-term duration, intermittent, and is therefore considered to be **negligible**.



12.11.11 The VE array areas overlap with the North Galloper (X5121) Navy PEXA, with the ECC overlapping three further PEXAs as outlined previously in paragraph 12.7.14 and shown in Figure 12.6. The potential impact relating to the presence of VE arises from the risk that any installation within the North Galloper (X5121) PEXA could impact on freedom of movement for military exercises, as military vessels may be less likely to choose to navigate close to or within the array. This would result in a reduction in level of activity that could be undertaken, and would not be reversible, therefore being of **low** magnitude.

SENSITIVITY OR VALUE OF RECEPTOR

12.11.12 Repair or maintenance works may be required to existing OWF export cables, which could be restricted by the physical presence of VE infrastructure. Restriction of access to an active cable for inspection and maintenance activities could be critical to the operation of that cable. VE OWFL will lease and engage with the relevant companies in order to arrange the necessary proximity and working practice agreements. OWF export cables are deemed to be of medium vulnerability, medium recoverability, and high value. However, due to the low likelihood of spatial and temporal overlap of proposed repair works with the constructed VE, and embedded mitigation in place, the sensitivity of this receptor to the physical presence of infrastructure is considered to be **low**.

12.11.13 There is the potential that repair or maintenance works are required to existing cables in the vicinity of VE during the operational phase. VE OFWL will engage with the relevant companies in order to arrange the necessary proximity and working practice agreements. Active and proposed subsea cables are deemed to be of medium vulnerability, medium recoverability, and high value. However, due to the low likelihood of spatial and temporal overlap of proposed repair works with the constructed VE, and embedded mitigation in place, the sensitivity of this receptor to the physical presence of infrastructure is considered to be **low**.

12.11.14 There is one extraction area in close proximity to the RLB for VE, this is Area 509/1 (shown on Figure 12.5). Dredging operations are potentially sensitive to access restrictions and activity displacement, which could occur through anchor snagging or interaction with the export cable. VE OWFL have agreed in-principle with Tarmac Marine Ltd that there are no issues despite the close proximity of this license area and commercial or technical agreements will be sought which will address any safety concerns prior to consent. Marine aggregates are therefore considered to be of medium value, high recoverability and low vulnerability, and therefore is considered to have **low** sensitivity to the physical presence of infrastructure.



12.11.15 The VE array areas overlap with the North Galloper (X5121) Navy PEXA, with the ECC overlapping three further PEXAs as outlined previously in paragraph 12.7.14 and shown in Figure 12.6. The sensitivity arises from the risk that any installation within the North Galloper (X5121) PEXA could impact on freedom of movement for military exercises, as military vessels may be less likely to choose to navigate close to or within the array. However, due to the comparative sizes of the array areas and the North Galloper PEXA, this would affect only a relatively small part of the military area. The MoD do not anticipate that the development will have any substantial impact. The receptor is therefore considered to be of high value, medium vulnerability, and medium recoverability, and the sensitivity to the physical presence of infrastructure is therefore considered to be **low**.

SIGNIFICANCE OF RESIDUAL EFFECT

12.11.16 Based on the assessments of receptor sensitivity and impact magnitude made above, the significance of residual effect on I&OMU receptors is considered as follows:

- > It is predicted that the sensitivity of OWFs is **low**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.
- > It is predicted that the sensitivity of subsea cables is **low**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.
- > It is predicted that the sensitivity of marine aggregate sites is **low**, and the magnitude of the impact is **negligible**. Therefore, the effect will be of **negligible** significance, which is not significant in EIA terms.
- > It is predicted that the sensitivity of military areas is **low**, and the magnitude of the impact is **low**. Therefore, the effect will be of **minor adverse** significance, which is not significant in EIA terms.

12.12 ENVIRONMENTAL ASSESSMENT: DECOMMISSIONING PHASE

12.12.1 The nature and scale of impacts arising from decommissioning are expected to be of similar or reduced magnitude to those generated during the construction phase. Certain activities, such as piling, will not be required.

12.12.2 It is possible that closer to the time of decommissioning in discussion with relevant regulators and statutory bodies, it is determined that removal of certain parts of the development (e.g. cables) will have a greater environmental impact than leaving the subsurface infrastructure *in situ*. In such an eventuality, and for these components of the Proposed Development, the impacts will be similar to those described for the operational phase, although aspects relating to maintenance or repair will not be required.

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



IMPACT 6: ACTIVITY OR ACCESS DISPLACEMENT ASSOCIATED WITH INCREASED VESSEL MOVEMENTS AND THE USE OF SAFETY ZONES DURING DECOMMISSIONING ACTIVITIES

- 12.12.4 Increases in vessel movements, and the physical presence of temporary safety zones (500 m) during the decommissioning works will be similar to those for construction and are of a similar magnitude. The magnitude of impacts and the sensitivities of I&OMU receptors to increased vessel movements are described in detail in Paragraph 12.10.1 *et seq.*
- 12.12.5 The largest study area for this potential impact is the Traffic Study Area, with the Direct Impacts Study Area considered for the use of safety zones (see Paragraph 12.4.13 and Figure 12.1). Infrastructure and assets that may be affected are outlined in Paragraph 12.10.3.
- 12.12.6 The magnitude of the impacts has been assessed as **negligible** to **low**, with the maximum sensitivity of the receptors being **medium**.
- 12.12.7 Mitigation will also be deployed during the decommissioning of VE, the details of which are anticipated to be informed by guidance and best practice at the time. Therefore, the significance of effects from activity and access displacement occurring from the decommissioning phase of VE will be of **minor adverse** significance at worst, which is not significant in EIA terms.

IMPACT 7: TEMPORARY INCREASES IN SSCS AND SUBSEQUENT DEPOSITION

- 12.12.8 Increases in SSC and sediment deposition from the decommissioning works will be similar or less those for construction and are of a similar or lesser magnitude. The magnitude of the impacts and the sensitivities of I&OMU receptors to increased SSC and sediment deposition are described in detail in paragraph 12.10.19 *et seq.*
- 12.12.9 The study area for this potential impact is the STEE (see Paragraph 12.4.13 and Figure 12.1). Infrastructure and assets that may be affected are outlined in Paragraph 12.10.20.
- 12.12.10 The magnitude of the impact has been assessed as **negligible** to **low**, with the maximum sensitivity of the receptors being **low**. Therefore, the significant of effects from changes in SSC and associated sediment deposition occurring as a result of decommissioning activities in the subtidal and intertidal areas has a maximum of **negligible** significance of effect, which is not significant in EIA terms.

IMPACT 8: DIRECT DISTURBANCE AND DAMAGE TO EXISTING ASSETS AND INFRASTRUCTURE

- 12.12.11 The potential for direct disturbance and damage to existing assets and infrastructure from decommissioning works will be similar to those for construction and of a similar magnitude. The magnitude of the impact and sensitivities of I&OMU receptors to this impact are described in detail in Paragraph 12.10.30 *et seq.*
- 12.12.12 The study area for this potential impact is the Direct Impacts Study Area (see Paragraph 12.4.13 and Figure 12.1). Infrastructure and assets that may be affected are outlined in Paragraph 12.10.32.
- 12.12.13 The magnitude of the impact has been assessed as **negligible** to **low**, with the maximum sensitivity of the receptors being **high**.



12.12.14 VE will implement a number of mitigation measures during the decommissioning phase (as outlined in Table 12.13) such as advanced warning of decommissioning operations and vessel routes and the use of safety zones. The significance of effect from direct disturbance to existing infrastructure occurring from the decommissioning of VE will be of **minor adverse** significance, which is not significant in EIA terms.

12.13 ENVIRONMENTAL ASSESSMENT: CUMULATIVE EFFECTS

12.13.1 This cumulative impact assessment for I&OMU has been undertaken in accordance with the methodology provided in Volume 1, Annex 3.1: Cumulative Effects Assessment Methodology. For I&OMU, the Traffic Study Area and STEE, as shown in Figure 12.1, have been applied to ensure direct and indirect cumulative effects can be appropriately identified and assessed. The ZoI has been determined as the largest distance over which an impact may occur; for the purpose of the I&OMU assessment, this is defined as a combination of the two largest study areas.

12.13.2 The projects and plans selected as relevant to the assessment of impacts to I&OMU are based upon an initial screening exercise undertaken on a longlist. Each project, plan or activity has been considered and scoped in or out on the basis of effect-receptor pathway, data confidence and the temporal and spatial scales involved. All relevant longlist plans and projects were allocated into tiers reflecting varying levels of certainty. These are defined in Volume 1, Annex 1.3: Cumulative Effects Assessment Methodology, and outlined here in Table 12.14.

Table 12.14: Description of Tiers of other developments considered for cumulative effect assessment.

Tiers	Development Stage
Tier 1	Projects under construction.
	Permitted applications, whether under the Planning Act 2008 or other regimes, but not yet implemented.
	Submitted applications, whether under the Planning Act 2008 or other regimes, but not yet determined.
Tier 2	Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has been submitted.
	Projects under the Planning Act 2008 where a PEIR has been submitted for consultation.
Tier 3	Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has not been submitted.
	Identified in the relevant Development Plan (and emerging Development Plans with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited.
	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/ approvals, where such development is reasonably likely to come forward.



12.13.3 For the purposes of assessing the impact of the VE on I&OMU in the region, the cumulative effect assessment technical note submitted through the EIA Evidence Plan and forming Technical Annex 3.1 of this PEIR screened in a number of projects and plans as presented in Table 12.15. Although Tier 3 projects have been presented in Table 12.15, due to a lack of available information these are not able to be fully assessed in the cumulative effect assessment. These developments may be incorporated into future assessments as more information becomes available.

Table 12.15: Projects considered within the I&OMU cumulative effect assessment.

Development type	Project	Status	Data confidence assessment/ phase	Tier
Aggregate Production Area	Area 509/1 (Tarmac Marine Ltd)	Operational	Medium – Third party project details published in the public domain and confirmed as being ‘accurate’	Tier 1
Aggregate Production Area	Area 509/2 (Tarmac Marine Ltd)	Operational	Medium – Third party project details published in the public domain and confirmed as being ‘accurate’	Tier 1
Aggregate Production Area	Area 510/2 (CEMEX UK Marine Ltd)	Operational	Medium – Third party project details published in the public domain and confirmed as being ‘accurate’	Tier 1
Aggregate Production Area	Area 509/3 (Tarmac Marine Ltd)	Operational	Medium – Third party project details published in the public domain and confirmed as being ‘accurate’	Tier 1
Aggregate Production Area	Area 510/1 (CEMEX UK Marine Ltd)	Operational	Medium – Third party project details published in the public domain and confirmed as being ‘accurate’	Tier 1
Aggregate Production Area	Area 508 (Britannia Aggregates Ltd)	Operational	Medium – Third party project details published in the public domain and confirmed as being ‘accurate’	Tier 1
Aggregate Production Area	Area 524 (DEME Building Materials Ltd)	Operational	Medium – Third party project details published in the public domain and confirmed as being ‘accurate’	Tier 1
Aggregate Production Area	Area 507/1 (CEMEX UK Marine Ltd)	Operational	Medium – Third party project details published in the public domain and confirmed as being ‘accurate’	Tier 1



Development type	Project	Status	Data confidence assessment/ phase	Tier
Aggregate Production Area	Area 507/4 (CEMEX UK Marine Ltd)	Operational	Medium – Third party project details published in the public domain and confirmed as being 'accurate'	Tier 1
Marine Disposal Site	Inner Gabbard (TH052)	Open	Medium – Third party project details published in the public domain and confirmed as being 'accurate'	Tier 1
Marine Disposal Site	Harwich Haven (TH027)	Open	Medium – Third party project details published in the public domain and confirmed as being 'accurate'	Tier 1
Marine Disposal Site	Inner Gabbard East (TH056)	Open	Medium – Third party project details published in the public domain and confirmed as being 'accurate'	Tier 1
Marine Disposal Site	East Anglia One (TH023)	Open	Medium – Third party project details published in the public domain and confirmed as being 'accurate'	Tier 1
Subsea Cable	NeuConnect Interconnector	Marine Licence Granted	Medium – Third party project details published in the public domain but not confirmed as being 'accurate'	Tier 1
Offshore Wind Farm	North Falls	Scoping	High – Third party project details published in the public domain and confirmed as being 'accurate' by TCE	Tier 2
Subsea Cable	Nautilus MPI	Proposed	Medium – Third party project details published in the public domain but not confirmed as being 'accurate'	Tier 3
Subsea Cable	Sea Link	Proposed	Medium – Third party project details published in the public domain but not confirmed as being 'accurate'	Tier 3



Table 12.16: Cumulative MDS.

Impact	Scenario	Justification
<p>Cumulative activity or access displacement associated with increased vessel movements and the use of safety zones</p>	<p>Tier 1:</p> <ul style="list-style-type: none"> > Consented NeuConnect Interconnector project (construction phase) > Active aggregates (operation) > Open disposal areas (operation) <p>Tier 2:</p> <ul style="list-style-type: none"> > North Falls OWF (construction phase) <p>Tier 3:</p> <ul style="list-style-type: none"> > Nautilus MPI > Sea Link 	<p>Impacts arising from increased vessel movements will be informed by the assessment carried out within Volume 2, Chapter 9: Shipping and Navigation.</p>
<p>Cumulative temporary increases in SSC and subsequent sediment deposition</p>	<p>Tier 1:</p> <ul style="list-style-type: none"> > Consented NeuConnect Interconnector project (construction phase) > Active aggregates (operation) <p>Tier 2:</p> <ul style="list-style-type: none"> > North Falls OWF (construction phase) <p>Tier 3:</p> <ul style="list-style-type: none"> > Nautilus MPI > Sea Link 	<p>Activities that interact directly with the seafloor and cable have potential to cause increases in SSC and deposition.</p> <p>A Cumulative Effects Assessment (CEA) has been undertaken within Volume 4, Annex 2.3: Physical Processes Technical Assessment for SSC and deposition. It was concluded that the potential for sediment plume interaction will be limited to instances in which VE construction activities occur simultaneously with construction activities in the proposed North Falls OWF, and aggregate extraction operations.</p>



12.13.4 A description of the significance of cumulative effects on I&OMU receptors arising from each identified impact is given below. The cumulative effects assessment has been based on information publicly available in the ESs for other developments. It is noted that the maximum assessment assumptions quoted within these ESs are often refined during the determination period and in the post-consent phase such that the final schemes built out may have a reduced impact when compared to what has previously been assessed.

CUMULATIVE ACTIVITY OR ACCESS DISPLACEMENT ASSOCIATED WITH INCREASED VESSEL MOVEMENTS AND THE USE OF SAFETY ZONES

12.13.5 There is potential for impacts arising from increased vessel movements and use of safety zones as a result of activities associated with VE in addition to the operational activities of other developments identified (see Table 12.16). These impacts will be informed by the assessment carried out within Volume 2, Chapter 9: Shipping and Navigation. Potential impacts will be mitigated through the use of a TMP and advanced warning of construction activities through NtM (as outlined in Table 12.13), therefore ensuring potential impacts are appropriately managed. It is therefore considered that due to the implementation of this mitigation, there will be limited scope for cumulative impacts on I&OMU receptors.

12.13.6 The sensitivity of I&OMU receptors to activity and access displacement is detailed in 12.10.1 *et seq.* which concluded that I&OMU receptors have **negligible** and **low** sensitivity to increased vessels movements, with a **medium** magnitude of impact at worst. Taking into consideration the localised, short-term nature of the impacts it is concluded that the significance of effect from temporary disturbance of the Proposed Development cumulatively is **minor adverse** significance at worst, which is not significant in EIA terms.

CUMULATIVE TEMPORARY INCREASES IN SSC AND SUBSEQUENT SEDIMENT DEPOSITION

12.13.7 There is potential for cumulative increases in SSC and deposition as a result of the construction activities associated with VE in addition to the operational activities of other developments identified (see Table 12.16). For the purposes of this preliminary assessment, the additive impact has been assessed within the STEE, which represents the maximum tidal excursion in the area, and therefore the furthest distance sediments may travel from the site. The other developments identified in Tier 1 are Exploration and Option Areas 524, 1802, and 528/2; Production Areas 509/1, 509/2, 510/2, 510/1, 508, 507/1, 507/4 and the NeuConnect Interconnector (see Figure 12.5), with North Falls OWF Interconnector in Tier 2. Tier 3 developments have not been fully assessed due to lack of available information, although a high level assessment has been carried out.



- 12.13.8 Aggregate licence areas 509/1, 509/2, 510/2, 509/3, 510/1, 508, 524, and 507/1 will be operational during the construction of VE and therefore there is potential for cumulative temporary increases in SSC and deposition from these active dredging operations. Potential changes to SSC, bed levels and sediment type have been modelled to inform the impact assessment, with further information provided in Volume 4, Annex 2.3: Physical Processes Technical Assessment. The SSC plumes generated during the construction (and operation) of VE are not predicted to reach the majority of the aggregate and disposal sites in any significant concentrations, with the exception of Area 509/1. Cumulative impacts associated with aggregate extraction are therefore likely to be indistinguishable from background levels due to tidal axis orientation and limited extent and duration of relevant sediment plumes, and any associated cumulative changes in bed level are also unlikely to be measurable in practice.
- 12.13.9 Area 509/1 is located 100 m from the VE offshore ECC, however is still located outside the 0-50 m zone of highest SSC increase and greatest likely thickness of deposition. Cumulative increases in bed level could still theoretically occur. However, it is noted that this location is characterised by high current speeds which regularly re-work mobile material at the bed, resulting in a general north-easterly direction in net bedload transport in the vicinity of Area 509/1 (Volume 4, Annex 2.1: Physical Processes Baseline Technical Report). Overall, it is therefore considered that there will be limited scope for cumulative impacts on I&OMU receptors.
- 12.13.10 Based on the CEA undertaken within Volume 4, Annex 2.3: Physical Processes Technical Assessment, interaction between sediment plumes created by activities at North Falls OWF and VE infrastructure is very unlikely due to the tidal axis orientation and distance between the projects. Interconnectors, including NeuConnect (Tier 1), Nautilus (Tier 3), and Sea Link (Tier 3), overlap the VE RLB and therefore have some potential for sediment plume interaction during construction and installation operations. However, the distances required between construction activities due to the presence of safety zones will reduce the potential for plume interaction and associated deposition. Exact volumes of sediment disturbed are not currently available for these projects, however theoretically the potential for more concentrated or persistent plumes than previously assessed in the VE-alone assessment is small, as outlined in Volume 2, Chapter 2: Marine Geology, Oceanography and Physical processes.
- 12.13.11 The sensitivity of I&OMU receptors to increased SSC and deposition is detailed in 12.10.19 *et seq.* which concluded that I&OMU receptors have **negligible** and **low** sensitivity to increased SSC and deposition, with a **negligible** magnitude of impact. Taking into consideration the localised, short-term nature of the impacts it is concluded that the significance of effect from temporary disturbance of the Proposed Development cumulatively is **negligible**, which is not significant in EIA terms.

12.14 INTER-RELATIONSHIPS

- 12.14.1 'Inter-relationships', which considers different parameters (e.g. noise and visual) impacting on the same receptor, will be addressed as a separate chapter in the ES. For I&OMU receptors, the most likely inter-relationship expected is that of I&OMU and Shipping and Navigation, specifically for other offshore windfarms and subsea cables. Further information is provided within Volume 2, Chapter 14: Inter-Relationships.



12.15 TRANSBOUNDARY EFFECTS

12.15.1 Transboundary effects arise when impacts from a development within one European Economic Area (EEA) state affect the environment of another EEA state(s). A screening of transboundary effects has been carried out and is present in Volume 1, Annex 3.2: Transboundary Screening. No potential transboundary impacts were screened into the assessment for I&OMU.

12.15.2 The Scoping Opinion (PINS, 2021; Table 12.2) raised the possibility of impacts on other EEA states occurring as a result of impacts on international interconnector cables such as the NeuConnect Interconnector. Impacts on these receptors have been assessed as part of the project-alone assessment, with all effects considered to be not significant in EIA terms.

12.16 SUMMARY OF EFFECTS

Table 12.17: Summary of effects for I&OMU.

Description of Impact	Effect	Additional mitigation measures	Residual impact
Construction			
Effect 1	Activity or access displacement associated with increased vessel movements and the use of safety zones during construction activities	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Effect 2	Temporary increases in SSC and subsequent deposition	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Effect 3	Direct disturbance and damage to existing assets and infrastructure	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Operation			
Effect 4	Activity or access displacement associated with increased vessel movements and the use of safety zones during operational and maintenance activities	Not Applicable – no additional mitigation identified	No significant adverse residual effects



Description of Impact	Effect	Additional mitigation measures	Residual impact
Effect 5	Physical presence of infrastructure	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Decommissioning			
Effect 6	Activity or access displacement associated with increased vessel movements and the use of safety zones during decommissioning activities	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Effect 7	Temporary increases in SSCs and subsequent deposition	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Effect 8	Direct disturbance and damage to existing assets and infrastructure	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Cumulative effects			
Effect 9	Cumulative activity or access displacement associated with increased vessel movements and the use of safety zones	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Effect 10	Cumulative temporary increases in SSC and subsequent sediment deposition	Not Applicable – no additional mitigation identified	No significant adverse residual effects



12.17 NEXT STEPS

12.17.1 The following steps will be undertaken in order to progress this chapter from PEIR stage to DCO Application stage:

- > Consultation will continue with relevant parties including cable operators and asset owners in order to identify potential impacts and develop suitable mitigation measures.
- > Up to date information on North Falls OWF, NeuConnect Interconnector and other Tier 2 and Tier 3 projects will be sourced, as far as is practical, to enable a detailed cumulative assessment to be carried out.
- > Efforts to work collaboratively with the North Falls project teams will be made to ensure an exchange of information and development of a strategic approach to mitigation measures.



12.18 REFERENCES

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