

Liverpool Bay CCS Ltd

HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Environmental Statement

Volume 2, chapter 14: Inter-Related Effects



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Glossary

Term	Meaning
Effect	The consequence of an impact
Environmental Impact Assessment	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Impact Assessment (EIA) Report.
Impact	A change that is caused by an action
Magnitude	Size, extent, and duration of an impact.
Maximum Design Scenario	The maximum design parameters of each Proposed Development asset considered to be a worst case for any given assessment but within the range of the Project Description Envelope.
Mitigation Measure	Measure which would avoid, reduce, or remediate an impact
Non-statutory stakeholder	Organisations with whom the regulatory authorities may choose to engage who are not designated in law but are likely to have an interest in a proposed development.
Project	The HyNet Carbon Dioxide Transportation and Storage Project.
Project lifetime effects	Effects that occur throughout more than one phase of the project (construction, operations and maintenance, and decommissioning) interacting to potentially create a more significant effect upon a receptor than if just assessed in isolation in a single phase.
Proposed Development	The offshore components of the Project which are subject of this Environmental Statement, as described in volume 1, chapter 3.
Receptor-led effects	Effects that interact spatially and/or temporally resulting in inter-related effects upon a single receptor.

Acronyms and Initialisations

Acronym and Initialisations	Description
CCS	Carbon Capture and Storage
DECC	Department of Energy and Climate Change
EIA	Environmental Impact Assessment
ES	Environmental Statement
INNS	Invasive and Non-Native Species
NPS	National Policy Statement
NRA	Navigation Risk Assessment
PTS	Permanent Threshold Shifts
SAC	Special Area of Conservation
SAR	Search And Rescue
SOLAS	Safety Of Life At Sea
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
SSSI	Site of Special Scientific Interest
TTS	Temporary Thresholds Shift
UK	United Kingdom
UXO	Unexploded Ordinance
ZOI	Zone Of Influence

Units

Unit	Description
km	Kilometres
km ²	Kilometres squared
m	Metres (distance)

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14 INTER-RELATED EFFECTS

14.1 Introduction

This chapter of the Offshore Environmental Statement (ES) presents the assessment of offshore inter-related effects associated with potential impacts of the Project (known as the 'Proposed Development'). Specifically, this chapter considers the potential offshore impacts during the construction, operations and maintenance, and decommissioning phases. The onshore impacts of the Project are addressed in chapter 19.

The assessment presented has taken into account other relevant impact assessments in this ES including:

- Chapter 6: Physical processes.
- Chapter 7: Marine biodiversity.
- Chapter 8: Ornithology.
- Chapter 9: Shipping and navigation.
- Chapter 10: Commercial fisheries.
- Chapter 11: Marine archaeology.
- Chapter 12: Infrastructure and other sea users.

14.1.1 Purpose of this chapter

The primary purpose of the Offshore ES is outlined in volume 1, chapter 1: Introduction. It is intended that the Offshore ES will provide the statutory and non-statutory stakeholders, with sufficient information to determine the likely significant effects of the Proposed Development on the receiving environment.

This inter-related effect chapter presents:

- the receptor groups considered within the inter-related assessment;
- the potential for effects on receptor groups across the three key Proposed Development phases (construction, operations and maintenance, and decommissioning); and
- the potential for multiple effects on a receptor group, as presented within the topic-specific chapters, to interact to create inter-related effects.

14.1.2 Study area

Due to the differing spatial extent of effects experienced by different offshore receptors, the study area for potential inter-related effects for the Proposed Development varies according to topic and receptor. The potential inter-related effects considered in this chapter are, therefore, also limited to the study areas defined in each of the topic-specific chapters.

14.1.3 Chapter structure

This chapter is structured as follows:

- Section 14.2: Policy and legislative context.
- Section 14.3: Consultation.
- Section 14.4: Data sources.
- Section 14.5: Assessment methodology.
- Section 14.6: Receptor based inter-related effects assessment.

- Section 14.7: Summary and conclusions.

14.2 Policy and legislative context

Planning policy on Carbon Capture and Storage (CCS) infrastructure is presented in volume 1, chapter 2. Planning policy on CCS, specifically in relation to inter-related effects for the Proposed Development, is contained in the Overarching National Policy Statement (NPS) for Energy (NPS EN-1; DECC, 2011a), the NPS for Fossil Fuel Electricity Generating Infrastructure (NPS EN-2; DECC, 2011b) and the NPS for Renewable Energy Infrastructure (NPS EN-3; DECC, 2021).

NPS EN-1 includes guidance on what matters are to be considered in the assessment. This is summarised in Table 14.1 below. If the NPSs are updated prior to the submission of the Marine Licence application, the revised NPSs will be fully considered in relation to inter-related effects within the ES, provided there is suitable time to ensure the changes can be made.

Table 14.1: Summary Of The NPS EN-1 Provisions Relevant To Inter-Related Effects

Summary of NPS EN-1 provision	How and where considered in the chapter
The Secretary of State should consider how the accumulation of, and interrelationship between, effects might affect the environment, economy or community as a whole, even though they may be acceptable when considered on an individual basis with mitigation measures in place. (EN-1, paragraph 4.2.6)	Proposed Development lifetime effects and receptor-led effects are assessed throughout this chapter of the ES.

14.3 Consultation

No challenges were raised in consultation activities undertaken to date (Liverpool Bay CCS Limited, 2022) specific to inter-related effects for the Proposed Development.

14.4 Data sources

The baseline environments for the receptor groups considered in this chapter are specific to each receptor group and are, therefore, set out in the relevant topic-specific chapters. This chapter draws on the conclusions made within the individual chapters for the assessment of impacts acting in isolation on the receptor groups. The relevant sections drawn upon in these inter-related effects assessment are presented in the ES chapters outlined in section 14.1.

14.5 Assessment methodology

The inter-related impact assessment has followed the methodology set out in volume 1, chapter 5. The following definition of inter-related effects has been applied throughout this chapter:

“Multiple effects upon the same receptor arising from the Hynet Carbon Dioxide Transportation and Storage Project. These occur either where a single effect acts upon a receptor over time to produce a potential additive effect or where a number of separate effects, such as underwater noise from impact piling and an increase in suspended sediments from laying cable, can affect a single receptor, for example fish and shellfish ecology”.

14.5.1 Guidance

Specific to the inter-related impact assessment, the Planning Inspectorate Advice Note 9 (The Planning Inspectorate, 2018) has been considered, with specific regard to the following text (paragraph 4.13):

“ensure that interactions (interactions between aspect assessments includes where a number of separate impacts, e.g. noise and air quality, affect a single receptor such as fauna) between aspect (the Planning Inspectorate refers to ‘aspects’ as meaning the relevant descriptions of the environment identified in accordance with the Environmental Impact Assessment (EIA) Regulations) assessments are taken into account relevant to the worst case scenario(s) established and that careful consideration is given to how these are assessed.”

The approach also serves to accommodate Planning Inspectorate Advice Note 9 regarding the need to consider the assessment as a whole and not as a series of unconnected specialist reports.

14.5.2 Approach to assessment

The approach to assessing inter-related effects within this chapter has followed a four-stage process, as summarised in Table 14.2 and outlined below. Further details on the approach summarised above and used to develop this chapter are presented in volume 1, chapter 5.

Table 14.2: Summary Of Staged Approach To The Inter-Related Effects Assessment For The Proposed Development

Stage	Description
1	Assessment of effects undertaken for individual ES topic areas within chapters 6 to 12.
2	Review of assessments undertaken within chapters 6 to 12 to identify ‘receptor groups’ requiring assessment.
3	Identification of potential inter-related (offshore) effects on receptor groups through review of the topic-specific assessments in the ES chapters.
4	Assessment undertaken on how individual effects may combine to create inter-related effects on each receptor group for: <ul style="list-style-type: none">• ‘Project lifetime effects’ (i.e. during construction, operations and maintenance and decommissioning phases).• ‘Receptor-led effects’ (i.e. multiple effects on a single receptor).

14.5.2.1 Stage 1: Topic-specific assessments

The first stage of the assessment of inter-related effects is presented in each of the individual ES topic chapters and comprises the individual assessments of effects on receptors across the construction, operations and maintenance and decommissioning phases of the Proposed Development.

14.5.2.2 Stage 2: Identification of receptor groups

Stage 2 involved a review of the assessments undertaken in the topic-specific chapters to identify ‘receptor groups’ requiring assessment within the inter-related effects assessment. The term ‘receptor group’ is used to highlight that the approach taken for the inter-related effects assessment will not assess every individual receptor assessed at the Environmental Statement stage, but rather potentially sensitive groups of receptors. The receptor groups assessed can be broadly categorised as those relating to the physical environment, the biological environment, and the human environment, as follows:

- Physical environment:
 - Physical processes.

- Biological environment:
 - Marine biodiversity (including benthic subtidal and intertidal ecology, fish and shellfish, and marine mammals); and
 - Ornithology.
- Human environment:
 - Shipping and navigation;
 - Commercial fisheries;
 - Marine archaeology; and
 - Infrastructure and other sea users.

It is important to note that the significance of effects on different receptors in the same receptor group (i.e. different species of birds in 'ornithology') may vary according to the sensitivity of receptors. Therefore, where a number of species have been considered within the assessments in this chapter, a range is provided for significance of effect.

For some other individual topic chapters, an assessment of potential inter-related effects is inherent within the chapter itself and as such, is not covered in this inter-related effects assessment. The topics where this applies are shown below in Table 14.3.

Table 14.3: Topics Not Included In The Inter-Related Effects Assessment

Topic	Definition
Marine Nature Conservation Sites*	The assessment of inter-related effects is central to the assessment of potential effects on the integrity of designated sites and has therefore already been assessed within the individual chapters of the ES, and within the Report to Inform the Appropriate Assessment. No additional levels of inter-related or receptor led effects are therefore considered to occur at the site level beyond those identified in the topic specific chapters of the ES and the Report to Inform the Appropriate Assessment.

*Items listed in the topic column do not necessarily correspond to a specific ES chapter. The Topic name presented refers to individual topics of receptors within a chapter.

14.5.2.3 Stage 3: Identification of potential inter-related effects on receptor groups

Following the identification of receptor groups, the potential inter-related effects on these receptor groups were identified via review of the impact assessment sections for each topic chapter. The judgement as to which impacts may result in inter-related effects upon receptors associated with the Proposed Development was based on the professional judgement and experience of the project team.

Linked receptor groups

It is important to recognise potential linkages between the topic-specific chapters within this ES, whereby effects assessed in each chapter have the potential for secondary effects on any number of other receptors.

Where such linked relationships arise, these have been fully assessed within the individual topic chapters. This chapter on inter-related effects (offshore) therefore summarises the consideration of these inter-related effects on linked receptors already set out in the preceding, topic-specific chapters.

It should be noted that it is considered that there are unlikely to be any receptor led effects from combined onshore and offshore activities, and as a result this has not been considered further in this inter-related effects chapter or the onshore inter-related effects chapter (chapter 19).

14.5.2.4 Stage 4: Assessment of inter-related effects on each receptor group

Individual effects on each of the key receptors were identified across the three Proposed Development phases (i.e. project lifetime effects) as well as the interaction of multiple effects on a receptor (i.e. receptor-led effects), as defined in Table 14.4. This information has been presented within the assessment tables in section 14.6: Receptor based inter-related effects assessment.

Table 14.4: Definitions Of Project Lifetime And Receptor-Led Inter-Related Effects

Effect type	Definition
Project lifetime effects	Assessment of the scope for effects that occur throughout more than one phase of the Proposed Development, (construction, operations and maintenance and decommissioning) to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three key project stages (e.g. underwater noise effects from construction, disturbance from maintenance work, vessels, and decommissioning).
Receptor-led effects	Assessment of the scope for multiple effects to interact to create inter-related effects on a receptor. As an example, multiple effects on a given receptor such as benthic habitats (e.g. direct habitat loss or disturbance, sediment plumes, scour, jack-up vessel use etc.) may interact to produce a different or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

The significance of the individual effects is presented in the summary of impacts, mitigation measures and monitoring tables for each receptor group within the topic-specific chapters (all conclusions for significance of effect for impacts defined in the topic chapters assume successful implementation of mitigation measures where appropriate (i.e. the residual effect has been used)). A descriptive assessment of the scope for these individual effects to interact to create a different or greater effect is then undertaken. This assessment incorporates qualitative and, where reasonably possible, quantitative assessments. The assignment of significance of effect to any such inter-related effect is not undertaken, rather, any inter-related effects that may be of greater significance than the individual effects acting in isolation on a given receptor are identified and discussed within this chapter.

The inter-related effects assessment presents and utilises the maximum significant adverse effects for the Proposed Development (i.e. the maximum design scenarios including successful implementation of measures adopted as part of the Proposed Development where appropriate), noting that individual effects may not be significant at the topic-specific level but could become significant when their inter-related effect is assessed.

Effects of negligible significance or greater (minor, moderate, major) may occur in only one phase of the project life cycle (e.g. during the construction phase but not the operations and maintenance or decommissioning phases). Where this is the case, it has been made clear that, as a result, there will be no inter-related effects across the Proposed Development phases. Effects of negligible significance identified in the individual topic assessments have been included since there is the potential for inter-related effects to increase the level (significance) of effect when considered with other sources.

14.6 Receptor based inter-related effects assessment

This section describes the potential effects on the receptor groups across all Proposed Development phases, including how the inter-related effects might interact with each other to affect a receptor.

14.6.1 Physical environment

14.6.1.1 Physical processes

For physical processes, the following potential impacts have been considered within the inter-related assessment:

- increased suspended sediment concentrations (SSCs) and sediment deposition; and
- activities affecting surrounding water quality.

Table 14.5 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operation and maintenance phase, and decommissioning of the Proposed Development, and the inter-related effects (receptor-led effects) that are predicted to arise for physical processes receptors.

As previously noted, effects on physical processes also have the potential to have secondary effects on other receptors and these effects are fully considered in the topic-specific chapters. These receptors and effects are:

- Benthic subtidal and intertidal ecology (chapter 7):
 - Increased SSCs and associated sediment deposition.
- Fish and shellfish ecology (chapter 7):
 - Increased SSCs and associated sediment deposition.
- Marine mammals (chapter 7):
 - Increased SSCs and associated sediment deposition.
- Marine Archaeology (chapter 11):
 - Sediment disturbance and deposition.
- Infrastructure and other sea users (chapter 12):
 - Increased SSCs and associated sediment deposition.

Table 14.5: Summary Of Potential Inter-Related Effects For Physical Processes

Description of impact	Phase ¹			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Increase in suspended sediments due to construction, operation and maintenance and/or decommissioning related activities, and the potential impact to physical features.	✓	✓	✓	Increases in SSC during construction phase would not extend into the operation and maintenance phase. Similarly, those increases which occur in the operation and maintenance phase due to maintenance activities would not extend to decommissioning. This is because SSC increases are temporary in nature (i.e. do not last for more than one or two tidal cycles) and return quickly to background levels during slack water.	No change resulting from inter-related assessment
Activities affecting surrounding water quality.	✓	✓	✓	Releases of contaminated sediments and accidental pollution from vessel activity during the construction phase will not extend into the operation and maintenance phase. Similarly, contaminated sediments and vessel pollution which may occur in the operation and maintenance phase due to maintenance activities would not extend into the decommissioning phase. Furthermore, embedded mitigation measures adopted to minimise the effects of this impact, such as development and adherence to an EMP (including a MPCP), which sets out pollution prevention methods and the requirement for all vessels to comply with the MARPOL regulations.	No change resulting from inter-related assessment.

Receptor-led effects

West Hoyle Bank and Dee Estuary Special Area of Conservation (SAC)/Special Protection Area (SPA)/Site of Special Scientific Interest (SSSI): During principally the construction phase increased suspended sediment concentrations and associated deposition on physical features may occur. Concurrently SSC plumes may cause toxicity effects through the mobilisation of contaminated sediments within the SSC plume. The vessels used in the construction phase may additionally cause accidental pollution. Construction activities are sporadic, with the impacts predicted to be of local spatial extent, short term duration and intermittent. Over West Hoyle Bank and within the Dee Estuary SAC/SPA/SSSI these impacts would be indistinguishable from background variations and would therefore not be significant in EIA terms.

¹ C – Construction; O – Operation; and D – Decommissioning

14.6.2 Biological environment

14.6.2.1 Marine biodiversity

Benthic subtidal and intertidal ecology

For benthic subtidal and intertidal ecology, the following potential impacts have been considered within the inter-related assessment:

- temporary and long term habitat loss/disturbance;
- increased SSCs and associated sediment deposition;
- increased risk of introduction and spread of invasive and non-native species (inns); and
- impacts resulting from the release of sediment bound contaminants.

Table 14.6 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Proposed Development, and the inter-related effects (receptor-led effects) that are predicted to arise for benthic ecology receptors.

As previously noted, effects on benthic ecology also have the potential to have secondary effects on other receptors and these effects are fully considered in the topic-specific chapters. These receptors and effects are:

- Commercial fisheries:
 - Increased risk of introduction and spread of INNS.

Table 14.6: Summary Of Potential Inter-Related Effects For Benthic Subtidal And Intertidal Ecology

Description of impact	Phase C O D			Likely significant inter-related effects	Inter-related significance
Temporary and long-term habitat loss/disturbance.	✓	✓	✓	<p>The total area of habitat potentially affected, when disturbance and loss are considered additively across all phases, is greater than for each individual phase (e.g. just the construction phase). However, temporary habitat loss/disturbance arising during each phase of the Proposed Development will be highly localised to the vicinity of the activities being undertaken (i.e. limited to the immediate footprint) during each phase (i.e. construction, operations and maintenance and decommissioning). Individual activities (e.g. jack-up activities, cable burial etc.) resulting in temporary habitat loss/disturbance will occur intermittently throughout this time with only a small proportion of the total area of habitat being impacted at any one time. The predominantly mixed sediment habitats present within the Proposed Development are typical of, and widespread throughout, the United Kingdom (UK) and in the east Irish Sea. All sediments and associated benthic communities are predicted to recover. Whilst there is the potential for repeat disturbance to occur during the operations and maintenance phase to habitats previously disturbed during the construction phase (e.g. as a result of jack-up activities and cable repair/reburial etc.) it is predicted that the benthic communities will have fully recovered from construction impacts by this time.</p> <p>Across the Proposed Development lifetime, the effects on benthic ecology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Increased SSCs and associated sediment deposition	✓	✗	✓	<p>Activities with the potential to result in the greatest level seabed disturbance and, therefore, highest increases in SSC/deposition, will occur during the construction phase. Any effects on benthic communities during this time will be intermittent, temporary and short term. The benthic subtidal Important Ecological Features (IEFs) potentially affected by increased SSC and deposition are predicted to have recovered in the intervening period between phases (i.e. prior to any localised increases in SSC during construction activities in the construction phase).</p> <p>Across the construction and decommissioning phases, the effects on benthic ecology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Increased risk of introduction and spread of invasive and non-native species	✓	✓	✓	<p>Although the presence and movement of construction/maintenance/decommissioning vessels in the area may facilitate the introduction and spread of INNS across all phases of the Proposed Development, this effect will predominantly arise during the operations and maintenance phase. This is because, the presence of the hard substrate associated with the infrastructure will be present in the operations and maintenance phase which may provide INNS with the necessary substrate on which to settle. However, the measures adopted as part of the Proposed Development include the implementation of an Invasive Non-Native Species Management Plan. This will ensure that the risk of potential introduction and spread of INNS will be minimised across all phases.</p> <p>Across the Proposed Development lifetime, the effects on benthic ecology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the Environmental Statement.</p>	No change resulting from inter-related assessment

Description of impact	Phase C O D	Likely significant inter-related effects	Inter-related significance
Impacts resulting from the release of sediment bound contaminants	✓ × ✓	<p>This impact is expected to occur in the construction and decommissioning phases of the Proposed Development during activities that disturb seabed sediments. However, additive effects across the lifetime of the Proposed Development are considered highly unlikely on the basis of the physical processes modelling outputs which have shown that increases in SSC (and therefore associated contaminants) will be temporary and will return to baseline within a few tidal cycles. This is not predicted to result in any significant combined impact across phases greater than what has been assessed for each individual phase. For example, remobilisation as a result of construction activities will only result in low concentrations of sediment-bound contaminants which as noted above will have been dispersed over a large area.</p> <p>Across the Proposed Development lifetime, the effects on benthic ecology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment

Receptor-led effects

There is the potential for spatial and temporal interactions between the effects arising from habitat loss/disturbance/alteration and increased SSC and associated sediment deposition and resuspension of contaminants on benthic habitats during the lifetime of the Proposed Development.

Based on current understanding, and expert knowledge, the greatest potential for inter-related impacts is predicted to arise through the interaction of direct (both temporary and permanent) habitat loss/disturbance from seabed preparation, foundation installation/jack-up/anchor placement/scour, indirect habitat disturbance due to sediment deposition and indirect effects of changes in physical processes due to the Proposed Development.

These individual impacts were assigned a significance of negligible to minor as individual impacts and although potential combined impacts may arise (i.e. spatial and temporal overlap of habitat disturbance), it is not predicted that this will result in effects of more significance than the individual impacts in isolation. This is because the combined extent of habitat potentially affected would be typically restricted to the Proposed Development and wider Zone of Influence (ZOI), the habitats affected are widespread across the UK and east Irish Sea and, where temporary disturbance occurs, full recovery of the benthos is predicted. In addition, any effects due to changes in the physical processes are likely to be limited, both in extent and in magnitude, with benthic ecology receptors having low sensitivity or high recoverability to the scale of the changes predicted.

Across the project lifetime, the additive effects on benthic ecology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.

Fish and shellfish ecology

For fish and shellfish ecology, the following potential impacts have been considered within the inter-related assessment:

- temporary and long term habitat loss/disturbance;
- underwater noise impacting fish and shellfish receptors; and
- increased SSCs and associated sediment deposition.

Table 14.7 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Proposed Development and the inter-related effects (receptor-led effects) that are predicted to arise for fish and shellfish ecology receptors.

As previously noted, effects on fish and shellfish ecology also have the potential to have secondary effects on other receptors and these effects are fully considered in the topic-specific chapters. These receptors and effects are:

- Marine mammals and marine turtles:
 - Effects on Marine Mammals and Marine Turtles due to changes in prey availability.
- Ornithology:
 - Indirect impacts from underwater noise affecting prey species; and
 - Changes in fish and shellfish communities affecting prey availability.
- Commercial fisheries:
 - Impacts on commercially important fish and shellfish resources.

Table 14.7: Summary Of Potential Inter-Related Effects For Fish And Shellfish Ecology

Description of impact	Phase			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Temporary and long-term habitat loss/disturbance	✓	✓	✓	When subtidal habitat loss (temporary and long term) is considered additively across all phases of the Proposed Development, although the total area of habitat affected is larger than for the individual Proposed Development stages, similar habitats are widespread across the fish and shellfish ecology study area and the wider Irish Sea. During the operational and maintenance phase, most of the disturbance will be highly localised, and the habitats affected are predicted to recover quickly following completion of maintenance activities with fish and shellfish IEFs recovering in the affected areas. Also, many operations and maintenance activities will be located in the same areas affected during construction (e.g. jack up operations, or reburial of exposed cables). Decommissioning will also be impacting the same locations, to a lesser degree than during construction. Across the Proposed Development lifetime, the effects on fish and shellfish ecology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the Environmental Statement.	No change resulting from inter-related assessment
Underwater noise impacting fish and shellfish receptors	✓	×	×	The impact of underwater noise will only arise during the construction phase and as such there will be no inter-related effects across the Proposed Development phases. Across the Proposed Development lifetime, the effects on fish and shellfish ecology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the Environmental Statement.	No change resulting from inter-related assessment

Description of impact	Phase			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Increased suspended SSCs and associated sediment deposition	✓	×	✓	<p>The majority of the seabed disturbance (resulting in highest SSC/deposition) will occur during the construction and decommissioning phases. IEFs and associated spawning/nursery habitats potentially affected by increased SSC and deposition will recover quickly following impact exposure such that there will be no inter-related effects across the construction and decommissioning phases.</p> <p>Across the Proposed Development lifetime, the effects on fish and shellfish ecology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the Environmental Statement.</p>	No change resulting from inter-related assessment

Receptor-led effects

Potential exists for spatial and temporal interactions between habitat loss or disturbance, underwater noise, increased SSC/deposition during the lifetime of the Proposed Development.

Based on current understanding, and expert knowledge, the greatest scope for potential impacts is predicted to arise through the interaction of habitat loss (temporary and long term), increased SSC, underwater noise during the construction phase, and operations and maintenance phase.

These individual impacts were assigned a significance of negligible to minor adverse as standalone impacts and although potential combined impacts may arise, it is important to recognise that some of the activities potentially resulting in combined effects are mutually exclusive. For example, most effects associated with an increase in SSC/deposition will arise from seabed preparation and installation of the Proposed Development's cables and pipelines, whereas most noise effects will at a different time or local. In addition, these impacts will be temporary and reversible following cessation of construction or decommissioning, with fish and shellfish communities expected to recover into the Proposed Development area. Furthermore, underwater noise is predicted to result in the displacement of mobile fish from areas which in turn will mean that these species will not be exposed to the greatest predicted increases in SSC. There may be localised changes in fish and shellfish communities in the areas affected by long term habitat loss, due to potential changes in substrate type and foraging opportunities. Any shifts in baseline assemblage will be limited to these areas and, therefore, effects of greater significance than the individual impacts in isolation (i.e. negligible to moderate) are not predicted.

Overall, the evidence presented in chapter 7, indicates that impacts on fish and shellfish receptors from construction operations are temporary and reversible and that fish and shellfish communities are not significantly adversely affected by the presence of infrastructure and therefore additive effects across impacts and phases are not expected to occur.

Across the Proposed Development lifetime, the additive effects on fish and shellfish ecology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.

Marine mammals and marine turtles

For marine mammals and marine turtles, the following potential impacts have been considered within the inter-related assessment:

- injury, disturbance, and displacement from underwater noise generated during piling;
- injury, disturbance, and displacement from underwater noise generated during unexploded ordnance (UXO) clearance;
- injury, disturbance, and displacement from underwater noise generated during geophysical and seismic site investigation surveys;
- injury, disturbance, and displacement from vessel activity and other noise producing activities;
- injury due to collision with marine vessels; and
- effects on marine mammals and marine turtles due to changes in prey availability.

Table 14.8 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance, and decommissioning phases of the Proposed Development and the inter-related effects (receptor-led effects) that are predicted to arise for marine mammal and marine turtle receptors.

As previously noted, marine mammals and marine turtles, and fish and shellfish ecology are linked receptor groups and the inter-related effects associated with a change in the distribution and/or abundance of prey species for marine mammals and marine turtles across each phase of the Proposed Development has been fully assessed in chapter 7 of the ES, with effects of negligible/minor adverse significance predicted for all Proposed Development phases.

Table 14.8: Summary Of Potential Inter-Related Effects For Marine Mammals And Marine Turtles

Description of impact	Phase C O D	Likely significant inter-related effects	Inter-related significance
Injury, Disturbance, and Displacement from Underwater Noise Generated during Piling	✓ × ×	<p>The impact of elevated underwater noise during piling will only arise during the construction phase and as such there will be no inter-related effects across the project phases of the Proposed Development.</p> <p>Across the Proposed Development lifetime, the effects on marine mammal and marine turtle receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Injury, Disturbance, and Displacement from Underwater Noise Generated during UXO Clearance	✓ × ×	<p>The impact of elevated underwater noise during UXO clearance will only arise during the construction phase and as such there will be no inter-related effects across the Proposed Development phases.</p> <p>Across the Proposed Development lifetime, the effects on marine mammal and marine turtle receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Injury, Disturbance, and Displacement from Underwater Noise Generated during Geophysical and Seismic Site Investigation Surveys	✓ × ×	<p>The impact of elevated underwater noise during site investigation surveys will only arise during the construction phase and intermittently throughout the operation and maintenance phase. As such there will be no inter-related effects across the project phases of the Proposed Development.</p> <p>Across the Proposed Development lifetime, the effects on marine mammal and marine turtle receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Injury, Disturbance, and Displacement from Vessel Activity and other Noise Producing Activities	✓ ✓ ✓	<p>Vessels will be used throughout all stages of the Proposed Development and therefore the impact of injury and disturbance to marine mammals and marine turtles from elevated underwater noise due to vessel use throughout all stages could cause additional disturbance to the receptor compared to considering each stage separately. For other activities, including drilling (foundation installation) and cable trenching/laying, the effect will only arise during the construction phase.</p> <p>Across the Proposed Development lifetime, the effects on marine mammal and marine turtle receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment

Description of impact	Phase C O D	Likely significant inter-related effects	Inter-related significance
Injury due to Collision with Marine Vessels	✓ ✓ ✓	<p>Over the lifetime of the Proposed Development there will be an ongoing risk of collision associated with vessel activity throughout all phases. If injury to marine mammals and marine turtles from collisions did occur this could lead to losses of individuals and potentially have an effect at the population-level, particularly for species with smaller populations. However, there is a high likelihood that marine mammals and marine turtles will avoid vessels, as they will be disturbed by underwater noise from the vessel, thereby reducing collision risk. In addition, with designed-in measures the risk of collisions will be further reduced through an Environmental Management Plan (EMP) with provisions for vessels and vessel movements, which includes provisions for vessels and vessel transit corridors to minimise the potential for collision risk.</p> <p>Across the Proposed Development lifetime, the effects on marine mammal and marine turtle receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Effects on Marine Mammals and Marine Turtles due to changes in Prey Availability	✓ ✓ ✓	<p>Fish and shellfish communities may be impacted through all phases of the Proposed Development and therefore could present a long-term effect on receptors through changes to prey availability. Inter-related effects on fish and shellfish receptors are described in more detail in Table 14.7 and in chapter 7. For all potential impacts and at all phases of the Proposed Development the effects are, however, predicted to be very localised and unlikely to lead to significant effects on marine mammals and marine turtles. Even in the context of longer-term impacts there is unlikely to be an additive effect as receptors can exploit a suite of prey species and only a small area will be affected when compared to available foraging habitat in the east Irish Sea.</p> <p>Across the Proposed Development lifetime, the effects on marine mammal and marine turtle receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment

Receptor-led effects

There is the potential for spatial and temporal interactions between the effects arising from elevated underwater noise (due to piling, UXO clearance, site investigation surveys, and vessel use and other (non-piling) activities), collision risk with vessels and changes in prey availability during the lifetime of the Proposed Development. Based on current understanding and expert knowledge, the greatest potential for inter-related effects is predicted to arise through the interaction of injury and disturbance from elevated underwater noise during piling, elevated underwater noise during UXO clearance, elevated underwater noise due to vessel use and other (non-piling) activities and elevated underwater noise during site investigation surveys, due to the Proposed Development.

These impacts were assigned a significance of negligible/minor as individual impacts and although potential combined effects may arise (i.e. spatial and temporal overlap of noise impacts) it is not predicted that this will result in effects of greater significance than the individual impacts in isolation. Whilst individual impacts could add to the overall duration of elevated underwater noise spatially, the extent of noise disturbance will be restricted to the Proposed Development and the extent of the largest Zone of Influence (i.e. piling). As Permanent Threshold Shifts (PTS) are not predicted to occur in any of the receptors, with the implementation of designed in measures, and Temporary Thresholds Shift (TTS) is a recoverable impact, it is predicted that there would be no inter-related effect. With respect to disturbance, the potential for inter-related effects is

Description of impact	Phase C O D	Likely significant inter-related effects	Inter-related significance
<p>considered to be minimal as individual animals are likely to be disturbed over a range dictated by the 'loudest' noise (i.e. leading to the greatest disturbance range) such that the potential for secondary (additive) effects from other activities that result in smaller ranges is reduced where animals are already disturbed over the largest effect range.</p> <p>Across the Proposed Development lifetime, the effects on marine mammal and marine turtle receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>			

14.6.2.2 Ornithology

For ornithology, the following potential impacts have been considered within the inter-related assessment:

- temporary habitat loss leading to displacement/disturbance of birds;
- disturbance and displacement from airborne sound and presence of vessels and infrastructure;
- collision with static offshore infrastructure;
- indirect impacts to birds from changes in prey availability; and
- accidental pollution in the surrounding area.

Table 14.9 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance phase, and decommissioning of the Proposed Development and the inter-related effects (receptor-led effects) that are predicted to arise for offshore ornithology receptors.

As previously noted, ornithological receptors and fish and shellfish receptors are linked and the inter-related effects associated with a change to the prey resources of ornithological receptors has been fully assessed in chapter 8: Ornithology, with effects of negligible/moderate significance predicted during construction, effects of no change to minor adverse significance predicted during the operations and maintenance phase and effects of negligible to moderate adverse significance during decommissioning.

Table 14.9: Summary Of Potential Inter-Related Effects For Ornithological Receptors

Description of impact	Phase			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Temporary habitat loss leading to displacement/disturbance of birds	✓	✗	✓	<p>During construction and decommissioning, seabirds may be indirectly disturbed and displaced as a result of direct impacts on habitat, which may result in the loss of a food resource to birds in the Proposed Development. This will lead to temporary habitat loss/disturbance at a local scale. The prey species and habitats potentially affected by construction and decommissioning are likely to recover during the operations and maintenance phase when no impacts are expected.</p> <p>The effects on ornithology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Disturbance and displacement from airborne sound and presence of vessels and infrastructure	✓	✓	✓	<p>The impact of disturbance and displacement caused by construction activities and associated vessel movements is predicted to be of no change to minor significance depending on species, which is not significant in EIA terms. The birds disturbed during the construction phase are expected to return as soon as the specific and locally active works are completed at the operations and maintenance phase. Although the shorter construction period has a displacement impact of lower magnitude than operation, it slightly extends the period over which displacement impacts may occur overall.</p> <p>During the operations and maintenance phase, the presence of infrastructure and vessels has the potential to directly disturb receptors, leading to displacement from the Proposed Development including an area of variable size or buffer (depending on species' sensitivity) around it. However, this effect was predicted to be of no change significance.</p> <p>Whilst the operations and maintenance phase will feature a much-reduced level of boat activity in comparison to the construction phase, the decommissioning phase will require similar number of vessels to the construction phase. The effects of decommissioning activities are expected to be similar magnitude to those arising from construction. Like the construction phase, the decommissioning phase has a displacement impact of lower magnitude than operation. Yet, it slightly extends the period over which displacement impacts may occur during the lifetime of the Proposed Development.</p> <p>Across the Proposed Development lifetime, the effects on ornithology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment

Description of impact	Phase			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Collision with static offshore infrastructure	x	✓	x	Across the Proposed Development lifetime, the effects on ornithology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.	No change resulting from inter-related assessment
Indirect impacts to birds from changes in prey availability	✓	✓	✓	Indirect impacts caused by a change in prey species (e.g. cod, sprat, herring, and sandeel) will occur during the construction, operation and maintenance and decommissioning phases. Across the Proposed Development lifetime, the effects on ornithology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.	No change resulting from inter-related assessment
Accidental pollution in the surrounding area	✓	✓	✓	Across the Proposed Development lifetime, the effects on ornithology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.	No change resulting from inter-related assessment

Receptor-led effects

There are the potential spatial and temporal interactions between the effects arising from temporary habitat loss, disturbance and displacement, indirect impacts to birds from changes in prey availability and accidental pollution in the surrounding area during the Proposed Development's lifetime.

However, based on current understanding and expert knowledge, the greatest scope for potential interaction impacts is predicted to arise through the following:

- Combined disturbance and displacement, and indirect impacts to birds from changes in prey species during construction; and
- Combined disturbance and displacement, and collision risk during operation and maintenance.

Individual impacts were assigned a significance of negligible to minor adverse as standalone impacts. Although potential combined impacts may arise, it is essential to acknowledge that some of the activities potentially resulting in combined effects would not be additive. For instance, the displacement effect on seabirds is expected to be very localised, intermittent, and short during the construction phase. Prey availability and habitats might also be altered during the construction phase, forcing the birds to re-distribute. In this scenario, the inter-related effects are expected to cancel each other out to a degree: a re-distribution of prey due to indirect disturbance/displacement will reduce the direct displacement effect of seabirds caused by construction activities. Compounding inter-related effects will only occur if seabirds continued to use the site where prey have been displaced from.

Individual impacts were assigned a significance of negligible to minor as standalone impacts and although potential combined impacts may arise, it is important to recognise that some of the activities potentially resulting in combined effects are mutually exclusive. Species cannot simultaneously exhibit a high level of avoidance (displacement effect) and a high level of collision risk (collision effect). Furthermore, there are differences in the species' susceptibility to the collision and displacement effects. Typically, species that forage on the wing (surface feeders (e.g. gulls)) will be more susceptible to collision risk and less affected by displacement as they move quickly between feeding opportunities. In contrast, sub-surface feeders and in particular species diving at great depths (e.g. Manx shearwater, divers and auks) would be more susceptible to displacement/disturbance: they feed for a prolonged period of time and fly less frequently between feeding patches, and thus at much-reduced level of collision risk.

Two species were assessed for the combined impact of displacement and collision risk: black-legged kittiwake and northern gannet. For both these species, the combined impact was of minor adverse significance, which is not significant in EIA terms.

Description of impact	Phase C O D	Likely significant inter-related effects	Inter-related significance
Across the Proposed Development lifetime, the effects on offshore ornithology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.			

14.6.3 Human environment

14.6.3.1 Shipping and navigation

For shipping and navigation, the following potential impacts have been considered within the inter-related assessment:

- vessel displacement leading to increased vessel to vessel collision risk between third-party vessels;
- increased vessel to vessel collision risk between a third-party vessel and a project vessel;
- reduced access to local ports;
- anchor interaction with subsea cable;
- fishing gear interaction with subsea cable;
- vessel grounding due to reduced under keel clearance; and
- reduction of emergency response capability due to increased incident rates for SAR (search and rescue) responders and increased demand on the available resources.

Table 14.10 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Proposed Development and the inter-related effects (receptor-led effects) that are predicted to arise for shipping and navigation receptors.

As previously noted, effects on shipping and navigation, due to an increase in vessels numbers also has the potential to have direct effects on marine mammals which has been fully assessed in chapter 7, with effects of minor adverse significance predicted across all Proposed Development phases and chapter 8 with effects of no greater than minor adverse significance across all Proposed Development phases.

Table 14.10: Summary Of Potential Inter-Related Effects For Shipping And Navigation

Description of impact	Phase C O D			Likely significant inter-related effects	Inter-related significance
Vessel displacement leading to increased vessel to vessel collision risk between third-party vessels	✓	✓	✓	Displacement of third-party vessels due to the presence of the Proposed Development increases the risk of collision or allision between third-party vessels. The Navigation Risk Assessment (NRA) conducted in chapter 9 was of sufficient detail that interactions between effects were considered, both from different phases and different receptors. This impact is expected to be greater during the construction and decommissioning phases. Across the Proposed Development lifetime, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.	No change resulting from inter-related assessment
Increased vessel to vessel collision risk between a third-party vessel and a project vessel	✓	✓	✓	Increase collision risk between third-party vessels and project vessels, due to the presence of vessels associated with the Proposed Development. The NRA conducted in chapter 9 was of sufficient detail that interactions between effects were considered, both from different phases and different receptors. This impact is expected to be greater during the construction and decommissioning phases. Across the Proposed Development lifetime, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.	No change resulting from inter-related assessment
Reduced access to local ports	✓	✓	✓	Reduced access to local ports will be relevant to all phases of the development, however the impact during the operation and maintenance phase is minimal due to the limited disruption associated with any maintenance required. Across the Proposed Development lifetime, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.	No change resulting from inter-related assessment
Anchor interaction with subsea cable	✓	✓	✗	This impact is expected to be greater during the construction phase if there is a period of time when the cable is surface-laid prior to burial works. During the operation and maintenance phase, cable burial (or other protection measures) will reduce the impact. Across the Proposed Development lifetime, the effect of anchor interaction on shipping and navigation receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.	No change resulting from inter-related assessment

Description of impact	Phase C O D			Likely significant inter-related effects	Inter-related significance
Fishing gear interaction with subsea cable	✓	✓	✗	<p>This impact is expected to be greater during the construction phase if there is a period of time when the cable is surface-laid prior to burial works. During the operation and maintenance phase, cable burial (or other protection measures) will reduce the impact from fishing gear.</p> <p>Across the Proposed Development lifetime, the effect of fishing gear interaction on shipping and navigation receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Vessel grounding due to reduced under keel clearance	✗	✓	✗	<p>This impact will only arise during the operation and maintenance phase and as such there will be no inter-related effects across the Proposed Development phases.</p> <p>Across the Proposed Development lifetime, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the Environmental Statement.</p>	No change resulting from inter-related assessment
Reduction of emergency response capability due to increased incident rates for SAR (search and rescue) responders and increased demand on the available resources	✓	✓	✓	<p>Project vessels will be managed through marine coordination and compliant with Flag State regulations. Additionally, should an incident occur, project vessels will be well equipped to assist, either through self-help capability or – for an incident involving a nearby third-party vessel – through The International Convention for the Safety of Life at Sea (SOLAS) obligations, all in liaison with the Maritime and Coastguard Agency.</p> <p>The NRA undertaken as part of the shipping and navigation chapter, volume 3, appendix L, was of sufficient detail that interactions between effects were considered, both from different phases and different receptors, and therefore the results would be the same.</p> <p>Across the Proposed Development lifetime, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment

Receptor-led effects

The presence of the construction and decommissioning areas during the construction and decommissioning phases, respectively, may result in the displacement from fishing grounds of commercial fishing vessels. This displacement and the associated reduction in available sea room will increase the vessel to vessel collision risk between third-party vessels. However, it is unlikely that effects will act together and that any interactions between effects will be of any greater significance than those already assessed for the Proposed Development alone.

Across the Proposed Development lifetime, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.

14.6.3.2 Commercial fisheries

For commercial fisheries, the following potential impacts have been considered within the inter-related assessment:

- loss or restricted access to fishing grounds;
- impacts on commercially valuable fish and shellfish species/resources;
- interference with fishing activity; and
- supply chain opportunities for local fishing vessels.

Table 14.11 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Proposed Development and the inter-related effects (receptor-led effects) that are predicted to arise for commercial fisheries receptors.

As previously noted, commercial fisheries receptors and fish and shellfish receptors are linked and the inter-related effects associated with potential impacts on commercially important fish species has been fully assessed in chapter 10, with effects of minor adverse or lower significance predicted for all Proposed Development phases.

Table 14.11: Summary Of Potential Inter-Related Effects For Commercial Fisheries

Description of impact	Phase C O D	Likely significant inter-related effects	Inter-related significance
Loss or restricted access to fishing grounds	✓ ✓ ✓	<p>During the construction and decommissioning phases of the Proposed Development, safety zones, and therefore the areas from which commercial fishing will be excluded, will be highly localised. During construction, for example, fishing will be excluded from 500m safety zones around infrastructure. During operation, fishing will be excluded from 500m safety zones around infrastructure. A minor effect is predicted for all receptor groups.</p> <p>While there will be a small incremental increase in the area in which fishing may be disrupted as the Proposed Development is built out, as fishing activity is likely to be able to continue elsewhere during all Proposed Development phases, effects on commercial fisheries across the phases are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase.</p> <p>Across the Proposed Development lifetime, the effects on commercial fisheries receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Impacts on commercially valuable fish and shellfish species/resources	✓ ✓ ✓	<p>Impacts to prey species (i.e. fish and shellfish) will be at their maximum during the construction phase as a result of effects associated with temporary habitat loss and/or disturbance, subsea noise impacting fish and shellfish receptors, increased suspended sediment concentrations and associated deposition, all assessed to be low adverse significance by chapter 7, used to inform chapter 10.</p> <p>Across the Proposed Development lifetime, the effects on commercial fisheries receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Interference with fishing activity	✓ ✓ ✓	<p>Smaller vessel sizes associated with inshore static gear vessel and offshore static gear vessel receptor groups may be affected by the presence of construction vessels during the construction and decommissioning phases within the Proposed Development. The marker buoys and actual gear deployed by the inshore static gear vessels are vulnerable to potential interference by construction vessels, due to their poor visibility. Although operational and maintenance vessel traffic will add to the existing level of shipping activity in the area, there are already moderate levels of vessel traffic in the area, and there is co-existence of fishing vessels with other marine traffic.</p> <p>Across the Proposed Development lifetime, the effects on commercial fisheries receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment

Description of impact	Phase			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Supply chain opportunities for local fishing vessels	✓	✓	✓	During the construction, operational and maintenance and decommissioning of the Proposed Development, there may be the opportunity for commercial fisheries operators to provide support to the Proposed Development, such as guard vessels and scouting surveys. Across the Proposed Development lifetime, the effects on commercial fisheries receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.	No change resulting from inter-related assessment

Receptor-led effects

There is potential for an inter-related effect from the combination of reduction in loss or restricted access to fishing grounds and supply chain benefits for local fishing vessels; this is because fishing vessels are likely to be providing marine operational support during periods of construction or maintenance works which would have resulted in a loss or restricted access to fishing grounds if the vessel had not been providing support to the Proposed Development. This means that the benefit to the local fishing vessels as a result of the supply chain opportunities is acting more as an alleviation of potential losses than an additional benefit. It is therefore predicted that any potential inter-related effect will reduce the beneficial significance of supply chain opportunities, which would result in a negligible beneficial significance.

14.6.3.3 Marine archaeology

For marine archaeology, the following potential impacts have been considered within the inter-related assessment:

- sediment disturbance and deposition leading to indirect impacts on marine archaeology receptors (the exposure or burial of receptors).

Table 14.12 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Proposed Development and the inter-related effects (receptor-led effects) that are predicted to arise for marine archaeology receptors.

As previously noted, marine archaeology and physical processes (i.e. sediment deposition) are linked receptors and the inter-related effects associated with a change to marine archaeological receptors has been fully assessed in chapter 11, with effects of minor adverse significance predicted during construction.

Table 14.12: Summary Of Potential Inter-Related Effects For Marine Archaeology

Description of impact	Phase			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Sediment disturbance and deposition leading to indirect impacts on marine archaeology receptors (the exposure or burial of receptors).	✓	✓	✓	The construction, operations and maintenance and decommissioning phases of the Proposed Development may lead to sediment disturbance and deposition leading to indirect impacts on marine archaeology receptors. Impacts of sediment disturbance and deposition during each Proposed Development phase have the potential to expose previously unrecorded marine archaeology receptors, and to bury or partially bury known marine archaeology receptors. Across the Proposed Development lifetime, the effects on marine archaeology receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.	No change resulting from inter-related assessment

Receptor-led effects

No receptor-led effects are expected for the Proposed Development across all phases.

14.6.3.4 Infrastructure and other sea users

For other sea users, the following potential impacts have been considered within the inter-related effects assessment:

- displacement of recreational activities;
- increased SSCs and associated deposition affecting recreational diving and bathing sites;
- impacts to existing cables or pipelines or restrictions on access to cables or pipelines;
- increased SSCs and associated deposition affecting aggregate extraction areas; and
- reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure).

Table 14.13 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Proposed Development and the inter-related effects (receptor-led effects) that are predicted to arise for infrastructure and other sea users receptors.

As previously noted, infrastructure and other sea users receptors and physical processes are linked receptors and the inter-related effects (i.e. a change to the sediment regime) on aggregate receptors has been fully assessed in chapter 12, with effects of negligible/minor significance predicted across all Proposed Development phases.

Table 14.13: Summary Of Potential Inter-Related Effects For Infrastructure And Other Sea Users

Description of impact	Phase			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Displacement of recreational activities	✓	✓	✓	<p>During the construction, operations and maintenance and decommissioning phases, the presence of infrastructure, safety zones and advisory safety distances, may lead to the displacement of recreational activities such as recreational sailing, water sports and fishing from the Proposed Development. The level of recreational activity is low. There is the potential for loss of recreational resource during nearshore/inshore activities in the construction phase. However, any displacement within the Proposed Development area will be temporary and is not likely to result in inter-related effects.</p> <p>Across the Proposed Development lifetime, the effects on infrastructure and other sea users receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Increased SSCs and associated deposition affecting recreational diving and bathing sites	✓	✓	✓	<p>During the construction, operations and maintenance and decommissioning phases the installation, maintenance and removal of infrastructure has the potential to increase SSC within the water column. There is potential that sediment plumes from resuspended sediment could impact recreational areas through changes to water quality. The impact will be of negligible to minor significance.</p> <p>Across the Proposed Development lifetime, the effects on infrastructure and other sea users receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Impacts to existing cables or pipelines or restrictions on access to cables or pipelines	✓	✓	✓	<p>During the construction, operations and maintenance and decommissioning phases existing cables and pipelines may be affected where they are crossed by the Proposed Development. In addition, access to existing cables and pipelines may be restricted during construction, maintenance and decommissioning activities due to the presence of the Proposed Development infrastructure, safety zones and advisory safety distances.</p> <p>Across the Proposed Development lifetime, the effects on infrastructure and other sea users receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment

Description of impact	Phase C O D	Likely significant inter-related effects	Inter-related significance
Increased SSCs and associated deposition affecting aggregate extraction areas	✓ ✓ ✓	<p>During the construction, operations and maintenance and decommissioning phases of the Proposed Development, the installation, maintenance and removal of infrastructure has the potential to increase SSC within the water column and to deposit disturbed sediments on the surrounding seabed. There is potential that sediment plumes from resuspended sediment could impact aggregate areas through sedimentation and the potential that this could affect the quality of aggregate (coarse sand deposits).</p> <p>Across the Proposed Development lifetime, the effects on infrastructure and other sea users receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment
Reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure)	✓ ✓ ✓	<p>Drilling and the placement of infrastructure will be restricted within the Proposed Development, with a 500m safety zones around installation vessels during the construction phase, and 500m safety zones established around infrastructure. As infrastructure is installed, the area available for seismic surveys and drilling will be restricted, and the presence of safety zones around infrastructure and vessels may also further restrict the ability to use certain alternative survey methods. The effects of decommissioning activities are expected to be the same or similar to the effects from construction.</p> <p>Across the Proposed Development lifetime, the effects on infrastructure and other sea users receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the ES.</p>	No change resulting from inter-related assessment

Receptor-led effects

No receptor-led effects are expected for the Proposed Development across all phases.

14.7 Summary and conclusions

The tables presented within this chapter assess potential inter-related effects arising from the Proposed Development on a range of receptor groups. Much of the content of these tables has been based upon assessments of individual impacts presented in the topic-specific ES chapters. The identification of potential inter-related effects has been based on a largely qualitative assessment using expert judgement, and noting that inter-related effects have already been accounted for, in many instances, within the assessments in the topic-specific chapters. The following conclusions arise in the context of physical, biological and human environments.

This chapter has defined the potential inter-related effects considered to arise from the Proposed Development. Proposed Development lifetime and receptor-led effects have been defined in order to differentiate the two types of inter-related effects that may arise as a result of the Proposed Development.

Based on one or a combination of the following factors: the low sensitivity of receptors; temporary and small-scale nature of effects; availability of alternative habitats; and factoring in proposed mitigation measures adopted as part of the Proposed Development, the overall significance of any inter-related effects is not judged to increase above the significance value assessed for individual effects in the topic-specific chapters.

14.8 References

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