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MONA OFFSHORE WIND PROJECT

Environmental Statement

Volume 2, Chapter 11: Inter-related Effects - Offshore (F02)

Deadline: 7

Application Reference: EN010137

Document Number: MOCNS-J3303-RPS-10049

Document Reference: F2.11 F02

14 January 2025

F02

Image of an offshore wind farm

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Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
F01	Application	RPS	Mona Offshore Wind Ltd	Mona Offshore Wind Ltd	Feb 2024
F02	Submission at Deadline 7	RPS	Mona Offshore Wind Ltd	Mona Offshore Wind Ltd	14 Jan 2025

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RPS

Prepared for:

Mona Offshore Wind Ltd.

Errata

Document section	Description of errata
Table 11.7	The row titled ‘‘Colonisation of hard substrate’ is incorrect and should read ‘Colonisation of hard structures’ as per the wording of the impact pathway assessed in Volume 2, Chapter 2: Benthic subtidal and intertidal ecology (APP-054).
Table 11.7	The row titled ‘Alteration of seabed habitats arising from effects of physical processes’ is an incorrect duplication of the row titled ‘Changes in physical processes’ which is also assessed and should, therefore, be disregarded.

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Tables

Glossary

Term	Meaning
Inter-related effects	Multiple effects upon the same receptor arising from the Mona Offshore Wind 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 sound and collision risk, affect a single receptor.
Project lifetime effects	Assessment of the scope for effects that occur throughout more than one phase of the Mona Offshore Wind Project (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 sound effects from construction piling, operational wind turbines, 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.

Acronyms

Acronym	Description
ATC	Air Traffic Control
ATS	Air Traffic Service
CCS	Carbon Capture Storage
DESNZ	Department for Energy Security and Net Zero
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMP	Environmental Management Plan
IEF	Important Ecological Feature
INNS	Invasive and Non-native Species
MDS	Maximum Design Scenario
MMMP	Marine Mammal Mitigation Protocol
MOD	Ministry of Defence
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NRW	Natural Resources Wales
NRW (A)	Natural Resources Wales Advisory Team
PAD	Protocol of Archaeological Discoveries

Acronym	Description
PEIR	Preliminary Environmental Information Report
PSR	Primary Surveillance Radar
REWS	Radar Early Warning Systems
SSC	Suspended Sediment Concentration
TEZ	Turbine Exclusion Zone
WSI	Written Scheme of Investigation
UK	United Kingdom
USMS	Underwater Sound Management Strategy
UXO	Unexploded Ordnance
ZoI	Zone of Influence

Units

Unit	Description
m	metre

11 Inter-related effects (offshore)

11.1 Introduction

11.1.1 Overview

11.1.1.1 This chapter of the Environmental Statement presents the offshore inter-related effects associated with potential impacts of the Mona Offshore Wind Project. Specifically, this chapter considers the potential offshore impacts of the Mona Offshore Wind Project during the construction, operations and maintenance, and decommissioning phases. The onshore impacts of the Mona Offshore Wind Project are addressed in Volume 3, Chapter 11: Inter-related effects (onshore) of the Environmental Statement.

11.1.1.2 The assessment presented has taken into account other relevant impact assessments and Annexes in this Environmental Statement including:

- Volume 2, Chapter 1: Physical processes of the Environmental Statement
- Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the Environmental Statement
- Volume 2, Chapter 3: Fish and shellfish ecology of the Environmental Statement
- Volume 2, Chapter 4: Marine mammals of the Environmental Statement
- Volume 2, Chapter 5: Offshore ornithology of the Environmental Statement
- Volume 2, Chapter 6: Commercial fisheries of the Environmental Statement
- Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement
- Volume 2, Chapter 8: Seascape and visual resources of the Environmental Statement
- Volume 2, Chapter 9: Marine archaeology of the Environmental Statement
- Volume 2, Chapter 10: Other sea users of the Environmental Statement
- Volume 4, Chapter 1: Aviation and radar of the Environmental Statement.

11.1.2 Purpose of chapter

11.1.2.1 The primary purpose of the Environmental Statement is outlined in Volume 1, Chapter 1: Introduction of the Environmental Statement. In summary, the primary purpose of an Environmental Statement is to support the Development Consent Order application for the Mona Offshore Wind Project under the Planning Act 2008 (the 2008 Act). The Environmental Statement constitutes the Environmental Information for the Mona Offshore Wind Project and sets out the findings of the Environmental Impact Assessment (EIA) to support the application consultation activities required under the 2008 Act. The Environmental Statement will accompany the application to the Secretary of State for Development Consent.

11.1.2.2 The Preliminary Environmental Information Report (PEIR) formed the basis for statutory consultation which lasted for 47 days and concluded on 04 June 2023. Comments received were reviewed and incorporated (where appropriate) into the Environmental Statement, which is submitted in support of the application for Development Consent.

11.1.2.3 In particular, this Environmental Statement chapter presents:

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

11.1.2.4 Although potential combined impacts may arise, it is important to recognise that some of the activities potentially resulting in combined effects are mutually exclusive.

11.1.3 Study area

11.1.3.1 Due to the differing spatial extent of effects experienced by different offshore receptors, the study area for potential inter-related effects (offshore) varies according to topic and receptor. The potential inter-related effects (offshore) considered in this chapter are, therefore, also limited to the study areas defined in each of the topic-specific chapters outlined in paragraph 11.1.1.2. The rationale for the exclusion of other topics from further inter-related effects assessment is presented in section 11.5.3 (see Table 11.4).

11.2 Policy context

11.2.1 National Policy Statements

11.2.1.1 There are currently six energy National Policy Statements (NPSs), three of which contain policy relevant to offshore wind development and the Mona Offshore Wind Project, specifically:

- Overarching National Policy Statement (NPS) for Energy (NPS EN-1) which sets out the United Kingdom (UK) Government's policy for the delivery of major energy infrastructure (Department for Energy Security and Net Zero (DESNZ), 2024a)
- NPS for Renewable Energy Infrastructure (NPS EN-3) (DESNZ, 2024b)
- NPS for Electricity Networks Infrastructure (NPS EN-5) (DESNZ, 2024c).

11.2.1.2 NPS EN-1 includes guidance on what matters are to be considered in the inter-related assessment. This is summarised in Table 11.1 below.

Table 11.1: Summary of the NPS EN-1 provisions relevant to inter-related effects (offshore).

Summary of NPS EN-1 provision	How and where considered in the Environmental Statement
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 4.3.19)	Project lifetime effects and receptor-led effects are assessed throughout this chapter of the Environmental Statement.

11.3 Consultation

11.3.1.1 A summary of the key issues raised during consultation activities undertaken to date specific to inter-related effects (offshore) is presented in Table 11.2 below, together with how these issues have been considered in the production of this Environmental Statement chapter.

Table 11.2: Summary of key consultation issues raised during consultation activities undertaken for the Mona Offshore Wind Project relevant to inter-related effects (offshore).

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
May 2022	Natural Resources Wales (NRW) – Scoping Opinion	With reference to section 4.3.8 Potential cumulative effects, section 4.3.9 Potential inter-related effects and section 4.3.10 Potential transboundary impacts, as advised above, NRW (A) disagree with the scoping boundaries and therefore do not agree with the assessment search areas described.	This issue related to Volume 2, Chapter 4: Marine mammals of the Environmental Statement and has been addressed within that chapter, with the marine mammal study areas and cumulative screening areas agreed via the EWG process. Therefore the marine mammal effects that are considered in this chapter account for the agreed study areas.

11.4 Data sources

11.4.1.1 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 this inter-related effects (offshore) assessment are presented in the Environmental Statement chapters outlined in section 11.1.1.

11.5 Impact assessment methodology

11.5.1 Overview

11.5.1.1 The inter-related effects (offshore) impact assessment has followed the methodology set out in Volume 1, Chapter 5: EIA methodology of the Environmental Statement. The following definition of inter-related effects has been applied throughout this chapter:

- ‘Multiple effects upon the same receptor arising from the Mona Offshore Wind 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 generation of underwater sound from project related activities and collision risk, affect a single receptor, for example marine mammals’.

11.5.2 Guidance

11.5.2.1 Specific to the inter-related effects (offshore) impact assessment, the Planning Inspectorate Advice Note 9 (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 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.'

11.5.2.2 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.

11.5.3 Approach to assessment

11.5.3.1 The approach to assessing inter-related effects within this chapter has followed a four stage process, as summarised in Table 11.3 and outlined below. Further details on the approach summarised above and used to develop this chapter are presented in Volume 1, Chapter 5: EIA methodology of the Environmental Statement.

Table 11.3: Summary of staged approach to the inter-related effects assessment for the Mona Offshore Wind Project

Stage	Description
1	Assessment of effects undertaken for individual EIA topic areas within Volume 2, Chapters 1 to 10 and Volume 4, Chapter 1 of the Environmental Statement.
2	Review of assessments undertaken within Volume 2, Chapters 1 to 10 and Volume 4, Chapter 1 of the Environmental Statement, 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 Environmental Statement chapters.
4	Assessment undertaken on how individual effects may combine to create inter-related effects on each receptor group for: • 'Project lifetime effects' (i.e. during construction, operations and maintenance and decommissioning phases) • 'Receptor-led effects' (i.e. multiple effects on a single receptor).

Stage 1: Topic-specific assessments

11.5.3.2 The first stage of the assessment of inter-related (offshore) effects is presented in each of the individual offshore Environmental Statement topic chapters and comprises the individual assessments of effects on receptors across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project.

Stage 2: Identification of receptor groups

11.5.3.3 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 EIA 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:

  - Benthic subtidal and intertidal ecology
  - Fish and shellfish ecology
  - Marine mammals
  - Offshore ornithology
- Human environment:
  - Commercial fisheries
  - Shipping and navigation
  - Aviation and radar
  - Marine archaeology
  - Seascape and visual resources
  - Other sea users.

11.5.3.4 It is important to note that the significance of effects on different receptors in the same receptor group (e.g. different species of birds in 'offshore 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.

11.5.3.5 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 effect assessment. The topics where this applies are shown below in Table 11.4.

Table 11.4: Topics not included in the Mona Offshore Wind Project inter-related effects assessment

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

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 Environmental Statement, and within the Draft Information to Support 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 Environmental Statement and the Draft Information to Support the Appropriate Assessment.

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

11.5.3.6 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 Mona Offshore Wind Project was based on the professional judgement and experience of the project team.

Linked receptor groups

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

- Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the Environmental Statement addresses effects on benthic habitats and species arising from changes to the physical environment (as described in Volume 2, Chapter 1: Physical Processes of the Environmental Statement)
- Volume 2, Chapter 4: Marine Mammals of the Environmental Statement assesses the effects on marine mammal receptors arising from potential changes in the distribution of fish, which form their principal prey (as described in Volume 2, Chapter 3: Fish and shellfish ecology of the Environmental Statement)
- Volume 2, Chapter 6: Commercial fisheries of the Environmental Statement assesses the effects on commercial fisheries receptors arising from potential impacts on commercial species of fish and shellfish as a result of a combination of effects caused by electromagnetic fields (EMFs), suspended sediments, habitat alteration/loss and effects caused by underwater sound
- Volume 2, Chapter 10: Other sea users of the Environmental Statement assesses the effects on aggregate extraction areas arising from potential impacts on aggregate resource as a result of potential increase in suspended sediment concentrations (SSCs) and deposition and effects on sediment transport pathways (as described in Volume 2, Chapter 1: Physical processes of the Environmental Statement).

11.5.3.8 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.

11.5.3.9 It should be noted that it is not considered that there are likely to be any receptor led effects from combined onshore and offshore activities and as a result this has not been considered further in this offshore inter-related effects chapter or the onshore inter-related effects chapter (Volume 3, Chapter 11: Inter-related effects (onshore) of the Environmental Statement).

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

11.5.3.10 Individual effects on each of the key receptors were identified across the three project 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 11.5. This information has been presented within the assessment tables in this chapter (see Table 11.6 to Table 11.12).

Table 11.5: 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 Mona Offshore Wind Project, (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 sound from piling, operational wind turbines, vessels and decommissioning).
Receptor-led effects	Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all 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.

11.5.3.11 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 (see Table 11.6 to Table 11.16). 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.

11.5.3.12 The inter-related effects assessment presents and utilises the maximum significant adverse effects for the project (i.e. the Maximum Design Scenario (MDS) including successful implementation of measures adopted as part of the Mona Offshore Wind Project 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 project 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.

11.6 Assessment of inter-related effects

11.6.1 Overview

11.6.1.1 For each of the receptor groups listed above, the scope for impacts to these receptors to create project lifetime effects over all the project phases and/or receptor-led effects through interacting together on the receptor group in question has been explored and discussed in the following sections.

11.6.2 Physical environment

Physical processes

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

- Increase in suspended sediments due to construction, operations and maintenance and/or decommissioning related activities, and the potential impact to physical features
- Changes to tidal currents, wave climate, littoral currents and sediment transport.

11.6.2.2 Table 11.6 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project and also the inter-related effects (receptor-led effects) that are predicted to arise for physical processes receptors. Project lifetime effects and receptor-led effects are defined in Table 11.5.

11.6.2.3 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
  - Increased Suspended Sediment Concentration (SSC)
  - Sediment deposition
- Fish and shellfish ecology
  - Increased SSC
  - Sediment deposition
- Marine mammals
  - Changes to tidal current and wave climate
  - Increased SSC
  - Sediment deposition
- Other sea users
  - Increased SSC.

Table 11.6: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for physical processes

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Increase in suspended sediments due to construction, operations 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 operations phase. Similarly, those increases which occur in the operations phase due to maintenance activities would not extend to decommissioning. Across the project lifetime, the effects on physical processes 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.	Negligible change resulting from inter-related assessment
Impacts to the tidal regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.	✓	✓	✓	Changes to tidal regime, wave climate and sediment transport due to infrastructure relate to the same structures within the construction, operations and decommissioning phases. The decommissioning phase structures are those remaining bed structures such as colonised scour protection when wind turbine structures have been removed, thus resulting in a lesser magnitude of the same impact.	Negligible change resulting from inter-related assessment
Impacts to the wave regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines.					Negligible change resulting from inter-related assessment
Impacts to sediment transport and sediment transport pathways due to presence of infrastructure and associated potential impacts to physical features and bathymetry.					Negligible change resulting from inter-related assessment
Receptor-led effects					
Menai Strait & Conwy Bay Special Area of Conservation, Constable Bank and Traeth Pensarn Site of Special Scientific Interest: During principally the operational phase increased suspended sediment concentrations and associated deposition on physical features may occur due to maintenance activities; this would coincide with changes to tidal currents, wave climate, littoral currents and sediment transport due to the presence of the structures. Maintenance activities are sporadic, with the impacts predicted to be of local spatial extent, short term duration and intermittent. These would not be significant in EIA terms.					

[a] C=construction, O=operations and maintenance, D=decommissioning

11.6.3 Biological environment

Benthic subtidal and intertidal ecology

11.6.3.1 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
- Disturbance/remobilisation of sediment-bound contaminants
- Colonisation of hard substrate
- Changes in physical processes
- Increased risk of introduction and spread of invasive and non-native species
- Removal of hard substrate
- Alteration of seabed habitats arising from effects of physical processes
- Electromagnetic Fields (EMF) from subsea electrical cabling
- Heat from subsea electrical cabling.

11.6.3.2 Table 11.7 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and also the inter-related effects (receptor-led effects) that are predicted to arise for benthic ecology receptors. Project lifetime effects and receptor-led effects are defined in Table 11.5.

11.6.3.3 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:

- Fish and shellfish ecology
  - Colonisation of hard substrates
- Commercial fisheries
  - Increased risk of introduction and spread of Invasive and Non-native Species (INNS).

Table 11.7: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for benthic ecology.

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Temporary and long term habitat loss/disturbance	✓	✓	✓	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 Mona Offshore Wind Project will be highly localised to the vicinity of the activities being undertaken (i.e. limited to the immediate footprints) 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 Mona Array Area are typical of, and widespread throughout, the 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. Across the project 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.	No change resulting from inter-related assessment
Increased SSCs and associated sediment deposition	✓	✓	✓	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 Feature's (IEF) 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 maintenance activities in the operations and maintenance phase). Across the project 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	No change resulting from inter-related assessment

[a] C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
				assessments presented for each individual phase or when considered in conjunction with other topics addressed in the Environmental Statement.	
Disturbance/remobilisation of sediment-bound contaminants	✓	✓	✓	This impact is expected to occur in the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Farm during activities that disturb seabed sediments. However, additive effects across the lifetime of the Mona Offshore Wind Project 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 therefore they will not interact with potential contaminants released from operations and maintenance activities. Across the project 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.	No change resulting from inter-related assessment
Colonisation of hard substrate	✓	✓	×	This impact will occur throughout the construction and operations and maintenance phases of the Mona Offshore Wind Project. The communities that develop on the introduced hard structures will likely differ from the surrounding sedimentary biotopes but may be typical of areas of coarse and stony substrate in the area and is likely to result in a change in biodiversity, such as the colonisation of intertidal species which would otherwise not be present. Also, the amount of the hard infrastructure is expected to be consistent between the construction and operations and maintenance phases, and this will provide long-term stability to any communities which form. Across the project 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.	Some change expected resulting from inter-related assessment, but currently considered to not be significant
Changes in physical processes	×	✓	✓	This impact is expected to occur in the operations and maintenance, and decommissioning phases. However, with the removal of foundations during the decommissioning phase, the magnitude of the impact will reduce during/after decommissioning with just the scour and cable protection potentially remaining *in situ*. Across the project 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	No change resulting from inter-related assessment

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
				phase or when considered in conjunction with other topics addressed in the Environmental Statement.	
Increased risk of introduction and spread of invasive and non-native species	✓	✓	✓	Although the presence and movement of construction/decommissioning vessels in the area may facilitate the introduction and spread of INNS across all phases of the Mona Offshore Wind Project, 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 Mona Offshore Wind Project include the implementation of an Offshore Environmental Management Plan with provisions for management of invasive and non-native species. This will ensure that the risk of potential introduction and spread of INNS will be minimised across all phases. Across the project 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.	No change resulting from inter-related assessment
Removal of hard substrate	×	×	✓	Across the project 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.	No change resulting from inter-related assessment
Alteration of seabed habitats arising from effects of physical processes	×	✓	×	Across the project 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.	No change resulting from inter-related assessment
EMF from subsea electrical cabling	×	✓	×	Across the project 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.	No change resulting from inter-related assessment
Heat from subsea electrical cabling	×	✓	×	Across the project 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.	No change resulting from inter-related assessment
Receptor-led effects					

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
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, EMF and heat on benthic habitats during the lifetime of the Mona Offshore Wind Project. 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 Mona Offshore Wind Project. 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 Mona Offshore Wind Project 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 (i.e. largely within the Mona Array Area) and also 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 Environmental Statement.					

Fish and shellfish ecology

11.6.3.4 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 sound impacting fish and shellfish receptors
- Increased SSCs and associated sediment deposition
- EMFs from subsea electrical cabling
- Colonisation of hard structures
- Disturbance/remobilisation of sediment-bound contaminants
- Injury due to increased risk of collision with vessels (basking shark only).

11.6.3.5 Table 11.8 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and also the inter-related effects (receptor-led effects) that are predicted to arise for fish and shellfish ecology receptors. Project lifetime effects and receptor-led effects are defined in Table 11.5.

11.6.3.6 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
  - Changes in fish and shellfish communities affecting prey availability
- Ornithology
  - Indirect impacts from underwater sound affecting prey species
  - Changes in fish and shellfish communities affecting prey availability
- Commercial fisheries
  - Impacts on commercially important fish and shellfish resources.

Table 11.8: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for fish and shellfish ecology.

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Temporary habitat loss/disturbance	✓	✓	✓	The impact of temporary habitat loss/disturbance will occur through all phases of the Mona Offshore Wind Project, however due to the temporary nature of habitat loss and disturbance, with recovery expected to occur to some extent following each occurrence, (recovery will be in the order of months to a number of years) and the extent of similar habitat available within the regional fish and shellfish ecology study area, inter-related effects across the project phases of the Mona Offshore Wind Project are expected to be limited. In addition, many operations and maintenance activities will be located in the same areas affected during construction (e.g. jack up operations adjacent to wind turbines, or reburial of exposed cables). Decommissioning will also be impacting the same locations, to a lesser degree than during construction. Across the project 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 sound impacting fish and shellfish receptors	✓	×	×	The impact of elevated underwater sound 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 Mona Offshore Wind Project from piling. Sound producing activities will occur during the lifetime of the project however events will be discrete, temporary and intermittent and will have no potential for inter-related effects. For example, seabed surveys may be undertaken periodically throughout the operations and maintenance phase of the Mona Offshore Wind Project, however these effects are expected to be minimal and short term, with no potential for inter-related effects across project phases. Further sound producing activities will occur during decommissioning phase, but with lesser effects than during the construction phase and with a large temporal separation to construction activities. Across the project 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	No change resulting from inter-related assessment

[a] C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
				than the assessments presented for each individual phase or when considered in conjunction with other topics addressed in the Environmental Statement.	
Increased SSCs and associated sediment deposition	✓	✓	✓	The impact of increased SSCs and associated deposition will occur through all phases of the Mona Offshore Wind Project, however due to the temporary nature of the effects, with rapid integration into the hydrodynamic and sediment transport regime, inter-related effects across the project phases of the Mona Offshore Wind Project are not expected. Across the project 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
Long term habitat loss	✓	✓	✓	The impact of long term habitat loss will extend through all phases of the Mona Offshore Wind Project, however the effects will not be additive, with the maximum long term habitat loss occurring during the operations and maintenance phase. As such, inter-related effects across the project phases of the Mona Offshore Wind Project are not expected to occur. Across the project 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
EMFs from subsea electrical cabling	×	✓	×	The impact of EMFs from subsea cabling will only arise during the operations and maintenance phase as such there will be no inter-related effects across the project phases of the Mona Offshore Wind Project. Across the project 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
Introduction of artificial structures and colonisation of hard structures	×	✓	✓	The impact of introduced artificial structures will only arise during the operations and maintenance phase and as such there will be no inter-related effects across the project phases of the Mona Offshore Wind Project. Colonisation of introduced structures will continue into the decommissioning phase, for those structures elected to remain in situ, however no inter-related effect is predicted across project phases due to colonisation of such structures. Across the project 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[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Disturbance/remobilisation of sediment-bound contaminants	✓	✓	✓	The impact of disturbance/release of sediment bound contaminants will occur through all phases of the Mona Offshore Wind Project, however due to the generally low levels of contaminants recorded within sediment samples, inter-related effects across the project phases of the Mona Offshore Wind Project are not expected. In addition, additive effects are not expected due to both modelling and literature suggesting re-sedimentation to negligible volumes within a few tidal cycles, which will not cause any significant combined impact across phases greater than what has been assessed for each individual phase. Across the project 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
Injury due to increased risk of collision with vessels	✓	✓	✓	Over the lifetime of the Mona Offshore Wind Project there will be an ongoing risk of collision associated with vessel activity throughout all phases. If injury to basking shark from collisions did occur, this could lead to losses of individuals transiting the region, but this is unlikely to lead to population level impacts. No basking shark were sighted during the aerial surveys undertaken for marine mammals and ornithology for the Mona Offshore Wind Project, suggesting that this area is not a key aggregation area for this species. In addition, with designed-in measures the risk of collisions will be further reduced through an Offshore Environmental Management Plan (EMP) with provisions for vessels and vessel movements and vessel transit corridors to minimise the potential for collision risk. Across the project 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

Receptor-led effects

Potential exists for spatial and temporal interactions between habitat loss or disturbance, underwater sound, increased suspended sediment concentrations/deposition, colonisation of hard substrates, EMF effects, disturbance and remobilisation of sediment-bound contaminants, and injury to basking shark from vessel collisions during the lifetime of the Mona Offshore Wind Project.

Based on current understanding, and expert knowledge, the greatest scope for potential interaction impacts is predicted to arise through the interaction of habitat loss (temporary and long term), increased suspended sediment concentrations, underwater sound from piling during the construction phase, and EMF effects during the operations and maintenance phase.

These individual impacts were assigned a significance of negligible to minor adverse as standalone impacts, with the exception of effects of underwater sound from piling, which was assessed to be moderate adverse, 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.

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
These impacts will be temporary and reversible following cessation of construction or decommissioning, with fish and shellfish communities expected to recover into the Mona Offshore Wind Project. Furthermore, underwater sound from piling operations is predicted to result in the displacement of mobile fish from areas around foundations which in turn will mean that these species will not be exposed to the greatest predicted increases in suspended sediment concentrations. Any potential behavioural effects as a result of EMFs would be likely to occur over the same area as habitat loss/change effects (i.e. within metres of the cable) and therefore habitat loss effects would not be additive to EMF effects. 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, and potential behavioural effects associated with EMFs. 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 minor adverse) are not predicted. Overall, the evidence presented in Volume 2, Chapter 3: Fish and shellfish ecology of the Environmental Statement, 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 operational wind farms and therefore additive effects across impacts and phases are not expected to occur. Potentially significant effects are predicted for herring and cod during their respective spawning periods, however the project has committed to the development of an Underwater Sound Management Strategy (USMS) (Document reference: J16), which will be used to define appropriate measures, such as reducing underwater sound emissions from piling to reduce potential magnitude of impact and thereby reducing the overall impact significance. This Strategy would outline mitigation measures to reduce underwater sound impacts to fish and shellfish receptors, along with those receptors for other topic areas. The USMS will be developed and agreed with stakeholders post-consent. As such, additive effects across impacts and topics are not expected to occur. Across the project 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 Environmental Statement.					

Marine mammals

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

- Injury and disturbance from elevated underwater sound during piling
- Injury and disturbance from elevated underwater sound during site investigation surveys
- Injury and disturbance from elevated underwater sound during unexploded ordnance (UXO) clearance
- Injury and disturbance from elevated underwater sound due to vessel use and other activities
- Increased risk of injury due to collision with vessels
- Underwater sound from wind turbine operation
- Changes in fish and shellfish communities affecting prey availability.

11.6.3.8 Table 11.9 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project and also the inter-related effects (receptor-led effects) that are predicted to arise for marine mammal receptors. Project lifetime effects and receptor-led effects are defined in Table 11.5.

11.6.3.9 As previously noted, marine mammals 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 across each phase of the project has been fully assessed in Volume 2, Chapter 4: Marine mammals of the Environmental Statement, with effects of minor adverse significance predicted for all project phases.

Table 11.9: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for marine mammals.

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Injury and disturbance from elevated underwater sound during piling	✓	×	×	The impact of elevated underwater sound 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 Mona Offshore Wind Project. Across the project lifetime, the effects on marine mammal 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
Injury and disturbance to marine mammals from elevated underwater sound during site investigation surveys	✓	×	×	The impact of elevated underwater sound during site investigation surveys will only arise during the construction phase and as such there will be no inter-related effects across the project phases of the Mona Offshore Wind Project. Across the project lifetime, the effects on marine mammal 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
Injury and disturbance to marine mammals from elevated underwater sound during UXO clearance	✓	×	×	The impact of elevated underwater sound during UXO clearance will only arise during the construction phase and as such there will be no inter-related effects across the project phases of the Mona Offshore Wind Project. Across the project lifetime, the effects on marine mammal 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
Injury and disturbance to marine mammals from elevated underwater sound due to vessel use and other activities	✓	✓	✓	Vessels will be used throughout all stages of the Mona Offshore Wind Project and therefore the impact of injury and disturbance to marine mammals from elevated underwater sound due to vessel use throughout all stages could cause additional disturbance to marine mammals 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.	No change resulting from inter-related assessment

[a] C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
				Across the project lifetime, the effects on marine mammal 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.	
Increased risk of injury of marine mammals due to collision with vessels	✓	✓	✓	Over the lifetime of the Mona Offshore Wind Project there will be an ongoing risk of collision associated with vessel activity throughout all phases. If injury to marine mammals 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, such as bottlenose dolphin and harbour seal. However, there is a high likelihood that marine mammals will avoid vessels, as they will be disturbed by underwater sound from the vessel, thereby reducing collision risk. In addition, with designed-in measures the risk of collisions will be further reduced through an Offshore EMP with provisions for vessels and vessel movements, which includes provisions for vessels and vessel transit corridors to minimise the potential for collision risk. Across the project lifetime, the effects on marine mammal 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 sound from wind turbine operation	×	✓	×	The impact of underwater sound from wind turbine operation will only arise during the operations and maintenance phase and as such there will be no inter-related effects across the project phases of the Mona Offshore Wind Project. Across the project lifetime, the effects on marine mammal 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
Changes in fish and shellfish communities affecting prey availability	✓	✓	✓	Fish and shellfish communities may be impacted through all phases of the Mona Offshore Wind Project and therefore could present a long-term effect on marine mammals through changes to prey availability. Inter-related effects on fish and shellfish receptors are described in more detail in Volume 2, Chapter 3: Fish and shellfish of the Environmental Statement. For all potential impacts and at all phases of the Mona Offshore Wind Project the effects are, however, predicted to be very localised and unlikely to lead to significant effects on marine mammals. Even in the context of longer-term impacts there is unlikely to be an additive effect as marine mammals 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. Across the project lifetime, the effects on marine mammal receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the	No change resulting from inter-related assessment

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
				assessments presented for each individual phase or when considered in conjunction with other topics addressed in the Environmental Statement.	

Receptor-led effects

There is the potential for spatial and temporal interactions between the effects arising from elevated underwater sound (due to piling, UXO clearance, site investigation surveys, and vessel use and other (non-piling) activities), increased likelihood of collision with vessels and changes in prey availability during the lifetime of the Mona Offshore Wind Project.

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 sound during piling, elevated underwater sound during UXO clearance, elevated underwater sound due to vessel use and other (non-piling) activities and elevated underwater sound during site investigation surveys, due to the Mona Offshore Wind Project.

Except for the impact of elevated underwater sound from UXO clearance for harbour porpoise only (which was given a moderate adverse significance), these impacts were assigned a significance of minor as individual impacts and although potential combined effects may arise (i.e. spatial and temporal overlap of impacts associated with underwater sound) 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 sound spatially, the extent of sound disturbance will be restricted to the Mona Offshore Wind Project and the extent of the largest ZoI (i.e. piling).

With the implementation of measures adopted (Volume 2, Chapter 4: Marine mammals of the Environmental Statement and adherence to the USMS (Document reference: J.16), Permanent Threshold Shift is not predicted to occur in any marine mammal species (as the Marine Mammal Mitigation Protocol (MMMP)(Document Reference: J.21) aims to reduce the likelihood of any significant impacts, such as injury to harbour porpoise from UXO clearance), and Temporary Threshold Shift is a recoverable impact, it is predicted that there would be no interrelated effect with respect to injury to marine mammal IEFs. With respect to disturbance, the potential for spatially interrelated effects is considered to be minimal as individual animals are likely to be disturbed over a range dictated by the 'loudest' sound (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, as animals are already disturbed and have moved away from the area of highest ensonification. Temporally, animals may return to the area between sound generating activities leading to repeated exposure to sound over extended duration, however it is not predicted that this will result in effects of greater significance than the individual impacts in isolation due to intervals between activities.

Across the project lifetime, the additive effects on marine mammal 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.

Offshore ornithology

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

- Disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure
- Indirect impacts from underwater sound affecting prey species
- Temporary habitat loss/disturbance and increased SSCs
- Collision risk
- Barrier effects.

11.6.3.11 Table 11.10 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance phase, and decommissioning of the Mona Offshore Wind Project and also the inter-related effects (receptor-led effects) that are predicted to arise for offshore ornithology receptors. Project lifetime effects and receptor-led effects are defined in Table 11.5.

11.6.3.12 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 Volume 2, Chapter 5: Offshore ornithology of the Environmental Statement, with effects of negligible significance predicted during construction, effects of negligible to minor adverse significance predicted during the operations and maintenance phase and effects of negligible to minor adverse significance during decommissioning.

Table 11.10: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for offshore ornithology.

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure	✓	✓	✓	The impact of disturbance and displacement caused by construction activities and associated vessel movements is predicted to be of negligible to minor significance depending on species, which is insignificant 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. During the operations and maintenance phase, the presence of operational wind turbines has the potential to directly disturb common guillemot, razorbill, Manx shearwater, northern gannet, black-legged kittiwake and red-throated divers, leading to displacement from the Mona Array Area including an area of variable size or buffer (depending on species' sensitivity) around it. This effect was predicted to be of negligible to minor significance depending on species. 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 Mona Offshore Wind Project Across the project 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 Environmental Statement.	No change resulting from inter-related assessment
Indirect impacts from underwater sound affecting prey species	✓	×	×	The impact of elevated underwater sound 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 Mona Offshore Wind Project. Across the project 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
Increased suspended sediment	✓	✓	✓	Indirect impacts caused by a change in prey species (e.g., cod, sprat, herring, and sandeel) will occur during the construction and decommissioning phases. There will be no inter related effects between construction and decommissioning which do not overlap.	No change resulting from inter-related assessment

[a] C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase[a] C	O	D	Likely significant inter-related effects	Inter-related significance
concentrations and associated sediment deposition				Across the project 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 Environmental Statement.	
Temporary habitat loss/disturbance and increased SSCs	✓	✓	✓	During construction and decommissioning, seabirds may be indirectly disturbed and displaced as a result of direct impacts on habitat and increased SSCs, which may result in the loss of a food resource to birds in the Mona Array Area and along the Mona Offshore Cable Corridor and Access Areas. This will lead to temporary habitat disturbance at a local scale. During the operations and maintenance phase, activities within Mona Array Area may lead to increases in SSCs and associated sediment deposition over the operational lifetime of the Mona Offshore Wind Project. The magnitude of the impacts would be a small fraction of those quantified for the construction and decommissioning phase. The prey species and habitats potentially affected by construction and decommissioning are likely to recover during the operations and maintenance phase. Across the project 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 Environmental Statement.	No change resulting from inter-related assessment
Collision risk	×	✓	×	Across the project 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 Environmental Statement.	No change resulting from inter-related assessment
Barrier effects	×	✓	×	Barrier effects may arise in addition to displacement. However, because the effect will only arise during the operations and maintenance phase, there will be no inter-related effects across the project phases of the Mona Offshore Wind Project. Across the project 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 Environmental Statement.	No change resulting from inter-related assessment

Receptor-led effects

Potential exists for spatial and temporal interactions between disturbance and displacement, indirect disturbance and displacement resulting from changes to prey species and habitats during the project's lifetime.

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

- Combined disturbance, displacement, and changes in prey species during construction
- Combined collision risk, displacement, disturbance and barrier effects during operations and maintenance.

Description of impact	Phase[a] C	O	D	Likely significant inter-related effects	Inter-related significance
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 – thus more likely to fly within rotor height. 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. Across the project 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 Environmental Statement.					

11.6.4 Human environment

Commercial fisheries

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

- Loss or restricted access to fishing grounds
- Displacement of fishing activity into other areas
- Interference with fishing activity
- Loss or damage to fishing gear due to snagging
- Potential impacts on commercially important fish and shellfish resources
- Supply chain opportunities for local fishing vessels
- Potential impacts on commercial fisheries as a result of increased risk of introduction and spread of INNS.

11.6.4.2 Table 11.11 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and also the inter-related effects (receptor-led effects) that are predicted to arise for commercial fisheries receptors. Project lifetime effects and receptor-led effects are defined in Table 11.5.

11.6.4.3 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 Volume 2, Chapter 6: Commercial fisheries of the Environmental Statement, with effects of minor adverse significance predicted for all project phases.

Table 11.11: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for commercial fisheries

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Loss or restricted access to fishing grounds	✓	✓	✓	During the construction and decommissioning phases of the project, 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 wind turbines and Offshore Substation Platforms. Rolling advisory exclusion zones of 500m will also be present around vessels installing inter-array cables, interconnector cables and subtidal export cables. Temporary restrictions to fishing activity and/or anchoring, will also be required in areas where full cable burial to target depth has not yet been achieved and/or surface-laid cable exists (prior to cover by external cable protection). In such areas of temporarily shallow-buried/surface-laid cable, the restricted areas will be monitored by Guard Vessels. During operations and maintenance, all commercial fisheries receptor groups will be able to continue fishing within the Mona Array Area. A negligible effect is predicted for all receptor groups with the exception of Scottish west coast scallop vessels, where a minor adverse effect is predicted. To mitigate the potential for project infrastructure to severely restrict fishing and to promote co-existence, the Applicant has committed to a Scallop Mitigation Zone (SMZ)that covers core scallop grounds located through the centre of the Mona Array Area, in a roughly north – south orientation. Where possible, the project aimed to run inter-array cables along north-south orientated wind turbines rows with few east-west running cables. This orientation of inter array cables and wind turbines along the perimeter of the SMZ is compatible with tows exhibited by vessels active within the Mona Array Area (as established via project-specific consultation feedback) and as such, fishing is expected to continue in the SMZ during the operations and maintenance phase. Such commitments, including the minimum extent of the SMZ, are committed to within the Outline Fisheries Liaison and Co-existence Plan (Document Number: J.13). While there will be a small incremental increase in the area in which fishing may be disrupted as the project is built out, as fishing activity is likely to be able to continue elsewhere during all project 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. Across the project 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 Environmental Statement.	No change resulting from inter-related assessment

[a] C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Displacement of fishing activity into other areas	✓	✓	✓	During operations and maintenance phase, the Scottish west coast scallop vessels may be restricted from fishing within the Mona Array Area and ultimately become displaced into other areas due to the presence of the offshore infrastructure and the minimum spacing between wind turbines. This receptor group has limited spatial tolerance due to significant dependence upon the commercial fisheries study area for queen scallop dredging. To mitigate the potential for project infrastructure to severely restrict fishing and ultimately result in displacement of fishing activity into other areas during the operations and maintenance phase, the Applicant has committed to a SMZ that covers core scallop grounds located through the centre of the Mona Array Area. By abiding by a SMZ and other agreed upon measures (i.e. orientation of turbines and alignment of inter array cables compatible with fishing) within the Outline Fisheries Liaison and Co-existence Plan (Document Number: J.13), it is assumed, therefore, that fishing by this receptor group will continue within the SMZ and other areas of the Mona Array Area, mitigating potential displacement of fishing activity into other areas and promoting co-existence during the operations and maintenance phase. Furthermore, it is noted that the other mobile gear receptor groups and offshore static gear vessels target a relatively large area in comparison to the Mona Array Area. It is also currently understood that a spatial 'gentleman's agreement' exists between the different gear types in operation in this area and it is assumed that this would continue during the operations and maintenance phase. Across the project 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 Environmental Statement.	No change resulting from inter-related assessment
Interference with fishing activity	✓	✓	✓	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 Mona Offshore Cable Corridor and Access Areas. 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. Across the project 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 Environmental Statement.	No change resulting from inter-related assessment

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Loss or damage to fishing gear due to snagging	✓	✓	✓	The construction, operational and maintenance and decommissioning of the Mona Array Area and Mona Offshore Cable Corridor and Access Areas may lead to loss or damage to fishing gear due to snagging. Snagging risks may occur as a result of infrastructure on the seabed, such as inter-array cables, offshore export cables and associated cable protection. Across the project 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 Environmental Statement.	No change resulting from inter-related assessment
Potential impacts on commercially important fish and shellfish resources	✓	✓	✓	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 underwater sound from piling, increased suspended sediments and habitat loss. Across the project 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 Environmental Statement.	No change resulting from inter-related assessment
Supply chain opportunities for local fishing vessels	✓	✓	✓	During the construction, operational and maintenance and decommissioning of the Mona Offshore Wind Project, there may the opportunity for commercial fisheries operators to provide support to the Project, such as guard vessels and scouting surveys. Across the project 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 Environmental Statement.	No change resulting from inter-related assessment
Potential impacts on commercial fisheries as a result of increased risk of introduction and spread of INNS	✓	✓	✓	As assessed in Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the Environmental Statement, no significant effects are likely to occur as a result of the risk of introduction and spread of INNS during the construction, operational and maintenance and decommissioning phases. Across the project 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 Environmental Statement.	No change resulting from inter-related assessment
Receptor-led effects					
There is potential for an inter-related effect from the combination of supply chain benefits for local fishing vessels and reduction in loss or restricted access to fishing grounds; this is because fishing vessels are likely to be providing marine operational support during periods of construction or major 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 Mona Offshore Wind Project. This means that the					

Description of impact	Phase[a] C	O	D	Likely significant inter-related effects	Inter-related significance
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. There is potential for an inter-related effect from the combination of the loss or restricted access to fishing grounds and the consequent displacement of fishing activity into other areas. This could result in increased gear conflict and pressure on other fishing grounds. During construction, static gear vessels may be required to relocate pots from areas of activity, which could increase intensity of activity in other areas or cause conflict with mobile gear species (i.e. scallop vessels). However, with successful implementation of the commitments and measures outlined within the Outline Fisheries Liaison and Co-existence Plan (Document Number: J.13) and Volume 2, Chapter 6: Commercial fisheries of the Environmental Statement, and the temporary nature of the works, it is not predicted that there will be any inter-related effect of greater significance than those already assessed in isolation.					

Shipping and navigation

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

- Displacement/interference of fishing activity
- Collision and allision risk of fishing vessels
- Interference with oil and gas activities
- Impact on emergency response capability
- Impact on marine navigation, communications and positioning systems.

11.6.4.5 Table 11.12 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and also the inter-related effects (receptor-led effects) that are predicted to arise for shipping and navigation receptors. Project lifetime effects and receptor-led effects are defined in Table 11.5.

11.6.4.6 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 Volume 2, Chapter 4: Marine mammals of the Environmental Statement, with effects of minor adverse significance predicted across all project phases and Volume 2, Chapter 5: Offshore ornithology of the Environmental Statement with effects of no greater than minor adverse significance across all project phases.

Table 11.12: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for shipping and navigation.

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Displacement/interference of fishing activity	✓	✓	✓	Displacement of fishing activity due to the presence of the Mona Offshore Wind Project and avoidance of other vessels. These impacts are assessed in Volume 2, Chapter 6: Commercial fisheries of the Environmental Statement. The Navigational Risk Assessment (NRA) conducted in Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement 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. Across the project 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.	No change resulting from inter-related assessment
Collision and allision risk of fishing vessels	✓	✓	✓	Displacement of fishing activity due to the presence of the Mona Offshore Wind Project increases the risk of collision or allision of fishing vessels. These impacts are assessed within this chapter but further details on fishing activity are provided in Volume 2, Chapter 6: Commercial fisheries of the Environmental Statement. The NRA conducted in Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement was of sufficient detail that interactions between effects were considered, both from different phases and different receptors. Across the project 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.	No change resulting from inter-related assessment
Interference with oil and gas activities	✓	✓	✓	The proximity of oil and gas assets and the movements of supply ships would be impacted by the presence of the Mona Offshore Wind Project. These impacts are assessed in Volume 2, Chapter 10: Other sea users of the Environmental Statement. The NRA conducted in Volume 2, Chapter 7: Shipping and	No change resulting from inter-related assessment

[a] C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
				navigation of the Environmental Statement was of sufficient detail that interactions between effects were considered, both from different phases and different receptors. Across the project 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.	
Impact on emergency response capability	✓	✓	✓	The need for search and rescue assets to enter the Mona Array Area has impacts upon aviation receptors. These impacts are assessed in Volume 4, Chapter 1: Aviation and Radar of the Environmental Statement. The NRA conducted in Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement 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. Across the project 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.	No change resulting from inter-related assessment
Impact on marine navigation, communications position fixing equipment	✓	✓	✓	Impacts to shore-based radar may occur in addition to marine radar. These impacts are assessed in Volume 4, Chapter 1: Aviation and Radar of the Environmental Statement. The NRA conducted in Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement 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. Across the project 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.	No change resulting from inter-related assessment
Receptor-led effects					
The presence of the buoyed 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 Mona Offshore Wind Project alone.					

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Across the project lifetime, the additive 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.					

Aviation and radar

11.6.4.7 For aviation and radar, the following potential impacts have been considered within the inter-related assessment:

- Creation of a physical obstacle to aircraft operations
- Wind turbines causing interference to civil Primary Surveillance Radar (PSR) systems.

11.6.4.8 Table 11.13 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and also the inter-related effects (receptor-led effects) that are predicted to arise for aviation and radar receptors. Project lifetime effects and receptor-led effects are defined in Table 11.5.

11.6.4.9 Aviation and radar receptors and other sea users receptors are linked receptors and the inter-related effects (i.e. restriction on access to infrastructure by both helicopter and vessel) are described in Table 11.13 below.

Table 11.13: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for aviation and radar.

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Creation of a physical obstacle to aircraft operations	✓	✓	✓	The individual standalone impacts were assigned minor adverse significance for military and low flying operations, negligible significance for helicopter operations, and minor adverse significance for instrument flight procedures after technical mitigation. Across the project lifetime, the effects on aviation and radar 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
Wind turbines causing interference to civil PSR systems	×	✓	×	This effect will only arise during the operations and maintenance phase and as such there will be no inter-related effects across the project phases. Across the project lifetime, the effects on aviation and radar 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
Receptor-led effects					
Potential exists for spatial and temporal interactions between direct impacts to offshore energy operators as aviation and radar receptors and other sea users receptors. Based on current understanding and expert knowledge, the greatest scope for potential inter-related impacts is predicted to arise from the following: • Creation of a physical obstacle to aircraft operations – helicopter operations • Reduction or restriction of other offshore energy activities (Volume 2, Chapter 10: Other sea users of the Environmental Statement). There is potential for both helicopter and vessel access to existing and future offshore hydrocarbon infrastructure to be restricted by the presence of the Mona Offshore Wind Project. Restriction of access for helicopters operating in support of the offshore hydrocarbon industry has been assessed as negligible significance. Restriction of vessel access to existing offshore energy assets has been assessed with no appreciable operational impact envisaged (see Volume 2, Chapter 10: Other sea users of the Environmental Statement). Therefore, the significance of these combined effects on offshore energy operators will not be of any greater significance than the effects when assessed in isolation.					

[a] C=construction, O=operations and maintenance, D=decommissioning

Marine archaeology

11.6.4.10 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.

11.6.4.11 Table 11.14 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and also the inter-related effects (receptor-led effects) that are predicted to arise for marine archaeology receptors. Project lifetime effects and receptor-led effects are defined in Table 11.5.

11.6.4.12 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 Volume 2, Chapter 9: Marine archaeology of the Environmental Statement, with effects of minor adverse significance predicted during construction.

Table 11.14: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for marine archaeology.

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Sediment disturbance and deposition leading to indirect impacts on marine archaeology receptors.	✓	✓	✓	Sediment disturbance and deposition during the construction, operations and maintenance, and decommissioning phases could combine to create an increased effect of exposure or burial to marine archaeology receptors. The measures adopted as part of the project as described in section 9.7 of Volume 2, Chapter 9: Marine archaeology of the Environmental Statement, include a Written Scheme of Investigation (WSI) and Protocol of Archaeological Discoveries (PAD) in accordance with the Written Scheme of Investigation and Protocol of Archaeological Discoveries submitted with the application (Document reference J18) in order to protect any marine archaeology uncovered during the lifetime of the project. Across the project 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 Environmental Statement.	Minor adverse
Alteration of sediment transport regimes	×	✓	×	This effect will only arise during the operations and maintenance phase. Across the project 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 Environmental Statement.	No change resulting from inter-related assessment

Receptor-led effects

Potential exists for interactions between indirect impacts to marine archaeological receptors. Based on current understanding and expert knowledge, the greatest scope for potential inter-related impacts is predicted to arise through the following:

- Combined effects of sediment disturbance and deposition and the alteration of sediment transport regimes during the operations and maintenance phase have the potential to further expose or bury marine archaeology receptors. The measures adopted as part of the Mona Offshore Wind Project will ensure procedures for the investigation, protection and recording of any as yet unknown marine archaeology through the WSI and PAD. It is therefore predicted that any inter-related effect will not be of any greater significance than those impacts already assessed in isolation (i.e., minor adverse).

[a] C=construction, O=operations and maintenance, D=decommissioning

Other sea users

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

- Displacement of recreational activities
- Increased SSC and associated deposition affecting recreational diving and bathing sites
- Impacts to existing cables or restriction of access to cables
- Reduction or restriction of other offshore energy activities
- Interference with the performance of Radar Early Warning Systems (REWS) located on oil and gas platforms
- Potential impact of rerouted traffic on REWS alarm rates.

11.6.4.14 Table 11.15 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and also the inter-related effects (receptor-led effects) that are predicted to arise for other sea users receptors. Project lifetime effects and receptor-led effects are defined in Table 11.5.

11.6.4.15 As previously noted, other sea users receptors and aviation and radar receptors are linked receptors and the inter-related effects (i.e. restriction on access to infrastructure by both vessel and helicopter) are described in Table 11.16 below.

Table 11.15: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for other sea users.

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Displacement of recreational activities	✓	✓	✓	During the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project, the presence of infrastructure, safety zones and advisory clearance distances may lead to the displacement of recreational activities from the Mona Array Area and along the Mona Offshore Cable Corridor and Access Areas. The level of recreational activity within the Mona Array Area is considered to be low, and there is low to moderate intensity recreational vessel activity in the vicinity of the Mona Offshore Cable Corridor and Access Areas. There is the potential for temporary loss of recreational resource during nearshore/inshore cable installation activities in the construction phase, however any displacement along the Mona Offshore Cable Corridor and Access Areas will be temporary and is not likely to result in inter-related effects. Across the Mona Offshore Wind Project lifetime, the effects on 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 Environmental Statement.	No change resulting from inter-related assessment
Increased SSCs and associated deposition affecting recreational diving and bathing sites	✓	✓	✓	During the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project the installation, maintenance and removal of infrastructure has the potential to increase SSCs within the water column, affecting recreational diving and bathing sites. It is anticipated that any deposited fine sediments would be subject to redistribution under the prevailing coastal processes. Across the Mona Offshore Wind Project lifetime, the effects on 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 Environmental Statement.	No change resulting from inter-related assessment
Impacts to existing cables or restriction of access to cables	✓	✓	✓	During the construction, operations and maintenance and decommissioning phases, the installation, maintenance and removal of infrastructure may lead to impacts on existing cables or restriction of access to cables. Cable crossing and proximity agreements will be established with relevant cable operators, to minimise the potential for any impact in accordance with recognised industry good practice. These agreements will ensure close communication and planning between both parties to ensure disruption of activities is minimised.	No change resulting from inter-related assessment

[a] C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
				Across the Mona Offshore Wind Project lifetime, the effects on 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 Environmental Statement.	
Reduction or restriction of other offshore energy activities	✓	✓	✓	During the construction, operations and maintenance and decommissioning phases, the installation, presence/maintenance and removal of infrastructure may lead to the reduction or restriction of other offshore energy activities in the local other sea users study area. Such activities may include surveys, drilling or vessel access to infrastructure for maintenance or decommissioning. Continued consultation with other offshore energy operators will ensure relevant parties are kept informed of planned activities in order to minimise both spatial and temporal interactions between conflicting activities and maximise coexistence. Across the Mona Offshore Wind Project lifetime, the effects on 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 Environmental Statement.	No change resulting from inter-related assessment
Interference with the performance of REWS located on oil and gas platforms	×	✓	×	This effect can only arise during the operations and maintenance phase. Across the project lifetime, the effects on other sea users 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
Potential impact of rerouted traffic on REWS alarm rates	×	✓	×	This effect can only arise during the operations and maintenance phase. Across the project lifetime, the effects on other sea users 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

Receptor-led effects

Potential exists for spatial and temporal interactions between direct impacts to offshore energy operators as other sea users receptors and aviation and radar receptors. Based on current understanding and expert knowledge, the greatest scope for potential inter-related impacts is predicted to arise from the following:

- Reduction or restriction of other offshore energy activities
- Creation of a physical obstacle to aircraft operations – helicopter operations (Volume 4, Chapter 1: Aviation and radar of the Environmental Statement).

There is potential for both vessel and helicopter access to existing and future offshore hydrocarbon infrastructure to be restricted by the presence of the Mona Offshore Wind Project. Restriction of vessel access to existing offshore energy assets has been assessed with no appreciable operational impact envisaged. Restriction of access for

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
helicopters operating in support of the offshore hydrocarbon industry has been assessed as negligible significance (see Volume 4, Chapter 1: Aviation and radar of the Environmental Statement). Therefore, the significance of these combined effects on offshore energy operators will not be of any greater significance than the effects when assessed in isolation.					

Seascape and visual resources

11.6.4.16 For Seascape and visual resources, the following potential impacts have been considered within the inter-related assessment:

- Seascape impacts – potential change to seascape and marine character through the introduction of the Mona Offshore Wind Project infrastructure
- Landscape impacts – potential change to landscape character through the introduction of the Mona Offshore Wind Project infrastructure
- Visual receptor impacts – changes to the visual baseline scenario may cause effects on a variety of visual receptors.

11.6.4.17 Table 11.16 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project, and also the inter-related effects (receptor-led effects that are predicted to arise for seascape, landscape and visual resources and receptors.

Table 11.16: Summary of likely significant inter-related effects on the environment for individual effects occurring across the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project and from multiple effects interacting across all phases (receptor-led effects) for seascape and visual resources.

[a] C=construction, O=operations and maintenance, D=decommissioning.

Description of impact	Phase[a]			Likely significant inter-related effects	Inter-related significance
	C	O	D		
Seascape impacts – potential change to seascape/marine character, through the introduction of the Mona Offshore Wind Project offshore infrastructure	✓	✓	✓	The significance of effects experienced by seascape/maritime character areas, due to the introduction of the offshore infrastructure of the Mona Offshore Wind Project, are directly related to the scale and size of development, geographic extent of impact, distance and context factors in relation to the resource or receptor. The significance of effects will vary between significant and not significant, diminishing with distance from the offshore infrastructure. The scale of effects will also increase through the construction phase and remain throughout the operations and maintenance phase, decreasing again through the decommissioning phase. Although this indicates that there is a potential lengthening of the temporal effect across the Mona Offshore Wind Project lifetime, the effects on seascape/marine character resources and 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. Across the project lifetime, the effects on seascape, landscape and visual resources and 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
Landscape impacts – potential change to landscape character and the special qualities of designated landscapes that lie within the offshore array study area, through the introduction of the Mona Offshore Wind Project offshore infrastructure	✓	✓	✓	The significance of effects experienced by landscape resources and receptors, due to the introduction of the offshore infrastructure of the Mona Offshore Wind Project within the east Irish Sea, are directly related to the scale and size of development, the geographic extent of impact, distance and context factors in relation to the resource or receptor. Effects on landscape receptors will not be significant due to the distance to the offshore infrastructure. The scale of effects will also increase through the construction phase and remain throughout the operations and maintenance phase, decreasing again through the decommissioning phase. Although this indicates that there is a potential lengthening of the temporal effect, across the Mona Offshore Wind Project lifetime, the effects on landscape character areas and designated landscapes 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.	No change resulting from inter-related assessment

[a] C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase[a] C	O	D	Likely significant inter-related effects	Inter-related significance
				Across the project lifetime, the effects on seascape, landscape and visual resources and 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.	
Visual impacts - potential change to views and visual amenity through the introduction of the Mona Offshore Wind Project offshore infrastructure	✓	✓	✓	The significance of effects experienced by visual receptors and on visual amenity, due to the introduction of the offshore infrastructure of the Mona Offshore Wind Project, are directly related to the scale and size of development proposed, the geographic extent of impact, and the distance and context factors in relation to the receptor. The significance of effects will vary between significant and not significant for sea-based visual receptors, diminishing with distance from the offshore infrastructure and not significant for land-based visual receptors, due to the distance from the offshore infrastructure. The scale of effects will increase through the construction phase and remain throughout the operations and maintenance phase, decreasing again through the decommissioning phase. Although this indicates that there is a potential lengthening of the temporal effect, across the Mona Offshore Wind Project lifetime, the effects on landscape character resources 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. Across the project lifetime, the effects on seascape, landscape and visual resources and 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

Receptor-led effects

There is the potential for spatial and temporal interactions between the potential impacts identified on seascape, landscape and visual resources and receptors. The greatest potential for inter-related effects is through the interaction of impacts on the known visual receptors within the seascape, landscape and visual resources study area. Combined effects on visual receptors will vary temporally and spatially across the seascape and visual resources study area according to the Mona Offshore Wind Project activities that are being undertaken. Significance varies depending on the receptor's distance to the Mona Offshore Wind Project with those closest to the Mona Array Area experiencing major impacts which then diminish with distance. The effects of construction will be temporary and will give way to operations and maintenance phase effects which will be fully reversible when the Mona Offshore Wind Project is decommissioned. Therefore, the significance of these combined effects on visual receptors will not be of any greater significance than the effects when assessed in isolation (i.e. negligible to major adverse).

11.7 Summary

11.7.1.1 The tables presented within this chapter assess potential inter-related effects arising from the Mona Offshore Wind Project 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 Environmental Statement 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.

11.8 Conclusion

11.8.1.1 This chapter has defined the potential inter-related effects considered to arise from the Mona Offshore Wind Project. Project 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 Mona Offshore Wind Project.

11.8.1.2 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 also factoring in proposed mitigation measures adopted as part of the project, 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.

11.9 References

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