FIVE ESTUARIES OFFSHORE WIND FARM

ENVIRONMENTAL STATEMENT

VOLUME 6, PART 4, CHAPTER 3: INTER-RELATIONSHIPS

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GLOSSARY OF TERMS

Term	Definition
Benthic ecology	Benthic ecology encompasses the study of the organisms living in and on the sea floor, the interactions between them and impacts on the surrounding environment
Cumulative effects	The combined effect of Five Estuaries Offshore Wind Farm (VE) in combination with the effects from a number of different projects, on the same single receptor/resource. Cumulative impacts are those that result from changes caused by other past, present or reasonably foreseeable actions together with VE.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Export cable corridor (ECC)	The specific corridor of seabed (seaward of Mean High Water Springs (MHWS)) and land (landward of MHWS) from the Five Estuaries array area to the proposed substation areas, within which the export cables will be located.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Impact Assessment (EIA) Report.
Habitat	The place in which a plant or animal lives. It is defined for the marine environment according to geographical location, physiographic features and the physical and chemical environment.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial, resulting from the activities associated with the construction, operation and maintenance, or decommissioning of the project.
Mitigation	Mitigation measures, or commitments, are commitments made by the project to reduce and/or eliminate the potential for significant effects to arise as a result of the project.

DEFINITION OF ACRONYMS

Term	Definition
AEZ	Archaeological Exclusion Zone
CEA	Cumulative Effects Assessment
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ES	Environmental Statement
IPC	Infrastructure Planning Commission (now the relevant Secretary of State)
LVIA	Landscape and Visual Impact Assessment
MPCP	Marine Pollution Contingency Plan
MDS	Maximum Design Scenario
MMMP	Marine Mammal Mitigation Protocol
PEMP	Project Environmental Management Plan
PINS	The Planning Inspectorate
SoS	Secretary of State
SLVIA	Seascape, Landscape and Visual Impact Assessment
SSC	Suspended Sediment Concentration
VE	Five Estuaries
VE OWFL	Five Estuaries Offshore Windfarm Limited
WSI	Written Scheme of Investigation

3 INTER-RELATIONSHIPS

3.1 INTRODUCTION

3.1.1 This chapter of the Environmental Statement (ES) summarises the assessment of inter-related effects across the physical, biological and human environments during the construction, operation and decommissioning phases of the project.

3.1.2 Inter-relationships can be defined as multiple effects on the same receptor group arising from the development of the Five Estuaries Offshore Wind Farm (VE), where a number of separate effects occur on a single receptor, leading to an additive effect beyond that described for each individual effect considered.

3.1.3 The chapters of the ES identify the potential environmental impacts arising from VE in respect of specific environmental parameters. These chapters have also been structured so as to identify and assess the potential for inter-relationships and any associated inter-related effects that may result.

3.1.4 This chapter has primarily been informed by the following ES chapters:

- Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality;
- Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology;
- Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology;
- Volume 6, Part 2, Chapter 7: Marine Mammal Ecology;
- Volume 6, Part 2, Chapter 10: Seascape, Landscape and Visual Assessment (SLVIA);
- Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage;
- Volume 6, Part 3, Chapter 2: Landscape and Visual Impact Assessment (LVIA);
- Volume 6, Part 3, Chapter 4: Onshore Biodiversity and Nature Conservation; and
- Volume 6, Part 3, Chapter 7: Onshore Archaeology and Cultural Heritage.

3.1.5 Due to the disparate location of VE's proposed compensatory measures for lesser black-backed gull, an additional EIA has been commissioned and the interrelationships for that part of the project are included in Volume 6, Part 8, Chapter 1: Lesser Black Backed Gull Compensatory Areas Environmental Impact Assessment.

3.2 STATUTORY AND POLICY CONTEXT

3.2.1 This section identifies legislation and policy of relevance to the interrelationships effects assessment. Full details of all policy and legislation relevant to the VE application are provided within Volume 6, Part 1, Chapter 2: Policy and Legislation. A summary of the current policy and legislation specific to interrelationships is provided below.

3.2.2 The Environmental Impact Assessment (EIA) Directive (European Council Directive 85/337/EEC) (the 'EIA Directive'), transposed into UK law via the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2017 (as amended) (collectively referred to as the 'EIA Regulations'), requires that inter-relationships be considered. Regulation 5(2)(e) of the EIA Regulations states that the following should be included in an Environmental Statement (ES):

(2) The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors—

(a) population and human health;

(b) biodiversity, with particular attention to species and habitats protected under [any law that implemented] Directive 92/43/EEC and Directive 2009/147/EC;

(c) land, soil, water, air and climate;

(d) material assets, cultural heritage and the landscape;

(e) the interaction between the factors referred to in sub-paragraphs (a) to (d).

3.2.3 This chapter has been compiled following guidance from the Planning Inspectorate (PINS) on the need to ensure that inter-related effects are fully addressed. The advice is outlined in PINS Advice Note Nine (PINS, 2018), which states:

'Where the Applicant chooses to follow a parameters-led assessment to establish the worst-case scenario for the ES, they should ensure that the applicable parameters are explained and clearly set out in order to

- *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; and*
- *ensure that the assessment of the worst case scenario(s) addresses impacts which may not be significant on their own but could become significant when they inter-relate with other impacts alone or cumulatively with impacts from other development (including those identified in other aspect assessments).'*

3.2.4 Section 4.3.19 of the Overarching NPS for Energy (NPS EN-1) (DESNZ, 2023) states that:

'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.'

3.3 CONSULTATION

3.3.1 Five Estuaries Offshore Wind Farm Limited (hereafter referred to as 'the Applicant') submitted a Scoping Report and request for a Scoping Opinion to the Secretary of State (SoS) (administered by the Planning Inspectorate (PINS)) in October 2021. A Scoping Opinion was received in November 2021. The Scoping Report sets out the proposed assessment methodology for inter-relationships. Table 3.1 sets out the comments received in the PINS Scoping Opinion and how these have been addressed in this chapter. The interrelationships Preliminary Environmental Information Report chapter also went through Section 42 consultation, although no comments relating to this chapter specifically were received.

Table 3.1: Summary of consultation relating to inter-relationships

Date and consultation phase/ type	Consultation comments and key issues raised	Section where comment addressed
Scoping Opinion (PINS, 2021)	The Inspectorate recommends that in order to assist the decision-making process, the Applicant uses tables to identify and collate the residual effects after mitigation for each of the aspect chapters, including the relevant interrelationships and cumulative effects.	Relevant interrelationships for each of the ES chapters are summarised in Table 3.3 - Table 3.10.

3.4 APPROACH AND METHODOLOGY

OVERVIEW

3.4.1 This assessment of inter-related effects considers only those effects as a result of VE and not from other projects. Other projects are considered within the Cumulative Effects Assessment (CEA) in each individual topic chapter. The approach to inter-relationships has been developed with specific regard to the guidance referred to in Section 3.2. Further detail regarding the methodology applied across the ES is described in Volume 6, Part 1, Chapter 3: EIA Methodology.

3.4.2 Inter-related effects can be divided into two categories, described below:

- **Project-lifetime effects**: Assessment of the scope for effects that occur throughout more than one project phase (i.e. construction, operation and decommissioning) to interact to potentially create an effect of greater significance than if assessed just within individual project phases. For example, increases to suspended sediment concentrations from activities across all three of the project phases stated above may combine to create an additive effect of greater significance than these impacts considered alone in each discrete project phase.
- **Receptor-led effects**: Assessment of the scope for all effects to interact (spatially and temporally) to create an effect on a receptor of greater significance than when the effects are considered in isolation. For example, effects due to increased noise and poorer air quality during the construction phase together could have an effect of greater significance on a residential receptor than each impact considered in isolation. The receptor-led effects assessment also considers whether a project lifetime inter-related effect is predicted for that impact.

3.4.3 The inter-related effects assessment thereby incorporates the findings of the individual assessment chapters to describe potential additional effects that may be of greater significance when compared to individual effects acting on a single receptor (or group). If there are additional effects, these are considered additively and qualitatively using expert judgement. The proposed approach is summarised in the following steps. For each EIA topic chapter:

- Identification of relevant receptors from assessments undertaken for individual EIA technical topics. This involves high-level description of the potential to produce interrelated effects on the topic area being assessed.

- Identification of the impact source and pathways that could affect that receptor and where those pathways are described and assessed. This involves cross referencing to other chapters and the impacts assessed within them relevant to the inter-related effects assessment for that topic. For project-lifetime effects, it is also determined whether there is potential for inter-related effects from the same impact across multiple project phases.
- Production of an inter-related effects assessment within the technical chapter, tabulating potential inter-related effects (both project-lifetime and receptor-led effects) and providing the relevant assessment narrative.

3.4.4 Effects that represent no change to the baseline (i.e. no impact) are unlikely to have interrelated effects when combined with other impacts and can be scoped out of the inter-related effects assessment. However, where impacts that have an effect significance of negligible or higher, interactions of greater significance than the impacts in isolation may occur. These are then considered through expert judgement.

3.4.5 In relation to project-lifetime effects, those that only occur over one project phase (e.g. just the construction phase) have no potential to interact with impacts of the same nature over multiple project phases and can therefore be scoped out of assessment. Effects that may be seen in the construction and decommissioning phases (but not the operational phase) are considered to be isolated and therefore recovery between these two phases is expected. It is not considered that there is the potential for inter-related effects where this situation arises, however expert judgement is applied on a case-by-case basis.

3.4.6 It should be noted that some elements of the impact assessment inherently consider interrelated effects. For example: the effects on fish and shellfish ecology have potential impacts for both marine mammals and offshore ornithology in terms of potential loss of prey resource. Where these potential inter-related effects are identified as being inherently considered in the impact assessment, this is described within the individual topic chapters.

APPROACH TO THE INTER-RELATED EFFECTS ASSESSMENT

3.4.7 All ES chapters include a consideration of inter-related effects and as noted above, many of the individual topic chapters address elements of inter-related effects by their nature. This holistic approach ensures that the EIA is comprehensive and assessed all relevant potentially significant effects upon all relevant receptors.

3.4.8 This chapter therefore summarises the consideration of inter-related effects already set out in the topic-specific chapter but also, where appropriate, gives detail of potential inter-related effects. Given the nature of VE and the consultation to date, there are a number of cases where potential impacts have been scoped out of the EIA altogether, which are not given further consideration in the inter-related effects assessment.

3.4.9 A list of topics excluded from the inter-related effects assessment, together with justification, is given in Table 3.2.

Table 3.2: Topics not considered in the inter-related effects assessment.

Topic	Justification
Marine Geology, Oceanography and Physical Processes (Volume 6, Part 2, Chapter 2)	The different physical processes studied are already inter-related; in particular, sediment transport is dependent on currents and waves and therefore these linked processes have already been considered within the assessment. In turn, this information on changes to physical processes has been used to inform other ES topics such as Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality, Volume 6, Part 2, Chapter 4: Offshore Ornithology and Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology, and Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology. Assessments have been undertaken separately within these individual topic chapters and are not reported here as additional inter-relationships.
Offshore Ornithology (Volume 6, Part 2, Chapter 4)	The potential for inter-related effects that could arise between project activities are those that have effect pathways that operate through food chains. Such inter-relationships are already addressed within Volume 6, Part 2, Chapter 4: Offshore Ornithology as indirect impacts on prey. The assessment of these impacts draws on assessments on the prey resources themselves in Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology, and Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology and Volume 6, Part 2, Chapter 7: Marine Mammal Ecology.
Commercial Fisheries (Volume 6, Part 2 Chapter 8)	Inter-related effects on commercial fisheries are considered with respect to Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology, Volume 6, Part 2, Chapter 9: Shipping and Navigation. The commercial fisheries assessment inherently considers impacts on fish resource through assessment of displacement or disruption to commercially important fish and shellfish receptors, drawing on the assessment in Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology. An assessment of the inter-related effects on shipping and navigation receptors is an inherent part of the formal Navigation Risk Assessment in Volume 9, Report 10: Navigational Risk Assessment (NRA). It considers the potential impact of VE construction vessels interacting with fishing vessels.
Shipping and Navigation (Volume 6, Part 2, Chapter 9)	An assessment of inter-related effects on shipping and navigation is an inherent part of the NRA presented in Volume 9, Report 10: NRA. The key inter-relationships are with commercial fisheries which, as described above, has been excluded from further consideration in the inter-related effects assessment. There are also key inter-relationships with Volume 6, Part 2, Chapter 12: Infrastructure and Other Marine Users which are discussed below.
Infrastructure and Other Marine	The assessment of potential effects on other marine users and activities presented in Volume 6, Part 2, Chapter 12: Infrastructure

Topic	Justification
Users (Volume 6, Part 2 Chapter 12)	and Other Marine Users of the ES inherently considers the inter-relationships between biological and human environment receptors. The assessment considers disruption to other human activities such as offshore renewables, cables and pipelines, oil and gas and aggregate and marine disposal sites through reference to the assessments of Volume 6, Part 2, Chapter 9: Shipping and Navigation and Volume6, Part 2, Chapter 13: Military and Civil Aviation. The assessment of offshore recreational activities such as recreational angling and water sports draws on the assessment and information within Volume 6, Part 2, Chapter 9: Shipping and Navigation and Volume 6, Part 2, Chapter 8: Commercial Fisheries. Therefore, inter-relationships on other marine users and activities are not considered further here.
Military and Civil Aviation (Volume 6, Part 2, Chapter 13)	Volume 6, Part 2, Chapter 13: Military and Civil Aviation considers that the greatest potential for inter-related effects occur due to the creation of aviation obstacles. Air Traffic Control provision and the rules of the air (including the 'see and be seen' principle) will reduce the potential for inter-relationships to occur, and it was therefore concluded that there would be no inter-related effects of greater significance than when considered in isolation, and therefore inter-related effects on aviation and radar receptors are not considered further here.
Socio-Economics, Tourism and Recreation (Volume 6, Part 3, Chapter 3)	The consideration of inter-relationships between socio-economics, tourism and recreation and other receptors is given throughout Volume 6, Part 3, Chapter 3: Socioeconomics, Tourism and Recreation. For example, marine and coastal recreational activities and water sports has been assessed within this chapter, which inherently links to Volume 6, Part 2, Chapter 8: Commercial Fisheries, Volume 6, Part 2, Chapter 9: Shipping and Navigation and Volume 6, Part 2, Chapter 13: Infrastructure and Other Marine Users. In addition, the assessment also inherently assesses the impact and disruption to Seascape and Landscape receptors, Traffic and Transport receptors and Noise and Vibration receptors. It is therefore considered there would be no inter-related effects of greater significance than when considered in isolation, and therefore inter-related effects on Socioeconomics, tourism and recreation are not considered further here.
Ground Conditions and Land Use (Volume 6, Part 3, Chapter 5)	The assessments of potential impacts on ground conditions, land use, hydrology and flood risk are inherently interlinked, as well as being linked to air quality, terrestrial ecology and airborne noise and vibration. Those assessments given in Volume 6, Part 3, Chapter 5:

Topic	Justification
Hydrology and Flood Risk (Volume 6, Part 3, Chapter 6)	Ground Conditions and Land Use and Volume 6, Part 3, Chapter 6: Hydrology, Hydrogeology and Flood Risk include a consideration of the likely inter-related effects and concluded that there would not be any significant inter-relationships, provided that standard mitigation measures are followed.
Traffic and Transport (Volume 6, Part 3, Chapter 8)	The assessment of air quality given in Volume 6, Part 3, Chapter 10: Air Quality includes consideration of the likelihood of air quality effects associated with traffic and transport, and is therefore inherently interlinked with Volume 6, Part 3, Chapter 8: Traffic and Transport. The traffic and transport assessment inherently considers effects in relation to both air quality and noise. The public health impact assessment inherently considers inter-relationships between topics including airborne noise and vibration and air quality against established health standards. The climate change assessment inherently considers inter-relationships between topics including an in-combination impact assessment for all topics across the ES. Therefore, inter-related effects on these topic areas are already assessed within the topic-specific chapters and are not considered further here.
Airborne Noise and Vibration (Volume 6, Part 3, Chapter 9)	
Air Quality (Volume 6, Part 3, Chapter 10)	
Human Health and Major Disasters (Volume 6, Part 4, Chapter 2)	
Climate Change (Volume 6, Part 4 Chapter 1)	

3.5 ASSESSMENT OF INTER-RELATED EFFECTS

3.5.1 The assessment of inter-related effects therefore considers the following receptors, with assessments presented in Table 3.3 to Table 3.10:

- Volume 6, Part 3, Chapter 2: LVIA;
- Volume 6, Part 3, Chapter 4: Onshore Biodiversity and Nature Conservation;
- Volume 6, Part 3, Chapter 5: Archaeology and Cultural Heritage;
- Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality;
- Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology;
- Volume 6, Part 2, Chapter 6: Fish and shellfish Ecology;
- Volume 6, Part 2, Chapter 7: Marine Mammal ecology;
- Volume 6, Part 2, Chapter 10: SLVIA; and
- Volume 6, Part 2, Chapter 11: Offshore archaeology and Cultural Heritage.

Table 3.3: Inter-related effects assessment – Marine Water and Sediment Quality.

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
Project lifetime effects			
Construction, operation and decommissioning	Deterioration of water quality due to re-suspension of sediments	Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes; and Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality.	The assessment concludes that these impacts across all phases would be of negligible to minor adverse significance, which is not significant in EIA terms. There is limited scope for inter-related effects to occur as a result of interactions between impacts on water and sediment quality. These impacts are predicted to occur directly as a result of impacts to marine physical processes.
	Accidental release of pollutants		
Receptor-led effects			
There is limited potential for temporal and spatial interactions between direct and indirect impacts to water and sediment quality. The scope for inter-related effects is predicted to arise through the combined effects of deterioration in water quality as a result of the re-suspension of sediments, and the accidental release of contaminants, which could in theory lead to impacts of a greater significance than when the two impacts are considered in isolation. However, as described above, the implementation of Volume 9, Report 18: Project Environmental Management Plan (PEMP) which will include a Marine Pollution Contingency Plan (MPCP) will ensure that in the unlikely event of accidental release of pollutants, measures will be in place to ensure that it does not result in significant effects. Therefore, it is not considered that this inter-relationship will result in effects of greater significance than the two impacts considered in isolation. Inter-relationships between marine water and sediment quality and biological receptors are considered in the tables below.			

Table 3.4: Inter-related effects assessment – Benthic and Intertidal Ecology.

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
Project lifetime effects			
Construction, operation and decommissioning	Temporary habitat disturbance Long-term habitat change due to introduction and subsequent removal of infrastructure	Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes; Volume 6, Part 2, Chapter 3: MW&SQ; and Volume 6, Part 2, Chapter 5: Benthic Subtidal and Intertidal Ecology.	The assessment concludes that these impacts across all phases were of minor adverse significance, which is not significant in EIA terms. When habitat loss or disturbance is considered additively across all three phases of development, the total area of habitat affected is larger than when considered in each phase individually. However, the disturbance is taking place within the same site and therefore this spatial area represents repeated rather than additional disturbance. Furthermore, the habitats affected are geographically widespread and are expected to recover within one to ten years of disturbance. Across the project lifetime, disturbance is not expected to occur to the point of irreversibility and once decommissioning is completed, full recovery to the baseline condition is expected within the one-to-ten-year window. Therefore, the project lifetime effects on benthic ecological receptors are not anticipated to result in inter-related effects of greater significance than the assessments conclude for each phase in isolation. With regard to long-term habitat change, the impact relates to the presence of infrastructure placed in the water column, an effect which persists throughout the

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
			lifetime of the project. It can therefore be thought of as occurring within a single 'project lifetime' phase rather than in three discrete phases. Once decommissioned, the environment is expected to return to its baseline condition within one to ten years and therefore no inter-related effects of greater significance than those considered in isolation are predicted.
Construction and operation	Increased risk of introduction of spread of marine Invasive and Non-Native Species (INNS)		The assessment concludes that these impacts across all phases were of minor adverse significance, which is not significant in EIA terms. There is limited potential for inter-related effects to occur as a result of the presence of infrastructure and project vessels across the construction and operation phases, both due to the negligible significance associated with these impacts and the mitigation of a biosecurity plan and adherence to best practice guidance to minimize the introduction and spread of INNS. It is therefore not anticipated that there will be any inter-related effects of greater significance than those occurring in isolation.
Construction and decommissioning	Temporary increases in Suspended Sediment Concentration (SSC) and sediment deposition		The assessment concludes that these impacts across all phases were of minor adverse significance, which is not significant in EIA terms. The majority of seabed disturbance (resulting in the highest increases in SSC and deposition) will occur during the construction phase, and to a lesser extent

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
			the operation and decommissioning phases depending on the methods employed. Effects are expected to be intermittent, discrete and temporary. Furthermore, the seabed habitats affected are expected to recover fully within one to ten years of the activity, and so full recovery from construction disturbance is expected by the time the project is decommissioned. Therefore, it is considered that there is no potential for inter-related effects of greater significance than the effects assessed in isolation.
Receptor-led effects			
There is the potential for spatial and temporal interactions between the effects arising from habitat loss/ disturbance and increases SSC and sediment deposition during the project lifetime. The greatest potential for inter-related effects is predicted to occur through the interaction of both temporary and permanent habitat loss/ disturbance from foundation installation/ jack-up vessels/ anchor placement/ scour, indirect habitat disturbance due to sediment deposition and indirect effects of the presence of infrastructure in the operational wind farm. With respect to this interaction, these individual impacts were assigned a significance of minor adverse as standalone impacts and although potential combined impacts may arise (i.e., spatial and temporal overlap of direct habitat disturbance), it is predicted that this will not be any more significant than the individual impacts in isolation. This is because the combined area of habitat potentially affected would be very limited, the biotopes affected are widespread, and where temporary disturbance occurs, full recovery of the benthos is predicted within one to ten years of disturbance. As such, these interactions are predicted to be no greater in significance than that for the individual effects assessed in isolation.			

Table 3.5: Inter-related effects assessment – Fish and Shellfish Ecology.

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
Project lifetime effects			
Construction, operation and decommissioning	Impacts on fishing pressure leading to displacement	Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes; Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality; Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology; Volume 6, Part 5, Annex 6.2: Underwater Noise Technical Report; and Volume 6, Part 2, Chapter 8: Commercial Fisheries.	The assessment concludes that these impacts across all phases were of minor adverse significance, which is not significant in EIA terms. Fishing pressure may be displaced across multiple phases of development as a result of temporary safety zones and the presence of infrastructure. However, the commercial fisheries assessment presented in Volume 6, Part 2, Chapter 8: Commercial Fisheries concluded that all impacts associated with displacement were of minor adverse significance with fishing activities expected to be able to continue with minimal disturbance within the project area. This, combined with the negligible adverse significance assessed for fish and shellfish ecology, means that there will be no inter-related effects of greater significance than those considered in isolation.
Construction and decommissioning	Mortality, injury, behavioural changes and auditory masking arising from underwater noise and vibration		The assessment concludes that these impacts across all phases were of minor adverse significance, which is not significant in EIA terms. The majority of disturbance from underwater noise is predicted to result from piling during the construction phase. Depending on the methods employed, noise during the decommissioning phase is expected to be

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
			of a much lower level (however still of minor adverse significance based on the Maximum Design Scenario (MDS) approach. Therefore, effects on fish and shellfish receptors from underwater noise in the construction and decommissioning phases are not expected to result in effects of greater significance than when considered in isolation.
	Direct damage and disturbance		The assessment concludes that these impacts across all phases were of minor adverse significance, which is not significant in EIA terms. When disturbance is considered additively across all three phases of development, the total area affected is larger than when considered in each phase individually. However, the majority of disturbance is expected to take place in the construction phase, with little repeat disturbance. Furthermore, the habitats disturbed are widespread throughout the region and are expected to fully recover by the time of decommissioning. Therefore, across the project lifetime, effects on fish and shellfish 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.
	Temporary increases in SSC and deposition		The assessment concludes that these impacts across all phases were of minor adverse significance, which is not significant in EIA terms.

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
			The majority of seabed disturbance, increased SSC and deposition will occur within the construction phase. Depending on the methods employed at the time, disturbance during decommissioning is expected to be less as activities such as sandwave clearance and seabed preparation will not be required to such an extent. Receptors and associated spawning and nursery grounds potentially affected are predicted to recover between construction and decommissioning and therefore, across the project lifetime, no inter-related effects of greater significance than those considered in isolation are predicted to occur.
Receptor-led effects			
The greatest scope for potential inter-related impacts is predicted to arise through the interaction of direct damage and disturbance, increased SSC and deposition and underwater noise effects. With respect to this interaction, these individual impacts were assigned a significance of minor adverse as standalone impacts and although potential inter-related impacts may arise, it is important to recognise that some of the activities are mutually exclusive. Furthermore, underwater noise from piling which is predicted to result in displacement of mobile fish species will in turn mean that these species will not be exposed to the greatest predicted increases in SSC from seabed preparation and drilling in the array area. Similarly, any potential behavioural effects would likely occur over the same areas as habitat loss/ disturbance, and therefore these effects would not be additive. Therefore, effects of greater significance than the individual impacts in isolation are not predicted.			

Table 3.6: Inter-related effects assessment – Marine Mammal Ecology.

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
Project lifetime effects			
Construction, operation and decommissioning	Effects due to vessel interaction/ disturbance	Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality; Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology; Volume 6, Part 5, Annex 6.2: Underwater Noise Technical Report; Volume 6, Part 2, Chapter 7: Marine Mammal Ecology; and Volume 6, Part 2, Chapter 9: Shipping and Navigation.	The assessment concludes that these impacts across all phases were of negligible to minor adverse significance, which is not significant in EIA terms. The construction and decommissioning phases are expected to occur approximately 24 to 40 years apart, and therefore there is no potential for inter-related effects between these two phases in terms of vessel disturbance, where the number of vessels, and therefore the potential for vessel interactions, is highest. During operation, the numbers of vessels required on site will be far lower than during construction and decommissioning, though it will occur over a longer time period. Due to the levels of significance predicted, and the adherence to best practice guidelines, it is not expected that inter-related effects on marine mammals of greater significance than those considered in isolation.
Construction and decommissioning	Effects due to underwater noise		The assessment concludes that these impacts across all phases were of negligible to minor adverse significance, which is not significant in EIA terms. Piling of driven foundations will be the main source of underwater noise on the construction phase, and underwater noise during decommissioning is expected to occur at a far

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
			lower level, depending on the decommissioning methods employed. Disturbance from underwater noise is predicted to be temporary, discrete, and intermittent throughout the construction phase, and full recovery is expected between construction and decommissioning. Furthermore, the commitment to a Marine Mammal Mitigation Protocol (MMMP) (Volume 9, Report 14: Marine Mammal Mitigation Protocol) will ensure that no lasting injurious effects occur on marine mammals. Therefore, no inter-related effects of greater significance than those considered in isolation are predicted to occur.
	Effects due to impacts to water quality		The assessment concludes that these impacts across all phases were of negligible adverse significance, which is not significant in EIA terms. Effects due to changes to water quality will only occur in the construction and decommissioning phases, and full recovery is expected during the operation phase. As such, project lifetime effects are not expected to result in inter-related effects of greater significance than those considered in isolation.

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
Receptor-led effects			
There is the potential for spatial and temporal interactions between underwater noise, vessel interactions, effects on prey species and water quality effects during the lifetime of VE. The greatest scope for interaction of different effects on marine mammal ecology is during the construction phase, when the most significant impact to marine mammals (i.e., underwater noise from piling) is likely to interact with other impacts. Therefore, the greatest scope for potential inter-related effects is likely to arise through the interaction of noise, vessel interactions and effects on prey species. With respect to this interaction, the individual impacts were assigned a significance of negligible to minor as standalone impacts and although combined impacts may arise it is important to note that some of these activities are potentially mutually exclusive. For example, underwater noise from piling will result in the displacement of marine mammals from the array area which will in turn mean that these species will not be exposed to effects of changes in water quality or reduction in prey species within that area. They will also be displaced from the areas of highest vessel traffic within the VE array area. The situation may also arise where any potential disturbance to prey species is offset by the fact that as marine mammals are temporarily displaced from areas around piling, the fish that form part of their diet may also be temporarily displaced, remaining available for marine mammal feeding. Overall, effects on prey species have been assessed as being of negligible adverse significance, and therefore there is limited potential for any receptor-led effects of greater significance than those assessed in isolation.			

Table 3.7: Inter-related effects assessment – SLVIA.

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
Project lifetime effects			
Construction, operation and decommissioning	Seascape, landscape and visual effects	Volume 6, Part 2, Chapter 10: Seascape, Landscape and Visual Impact Assessment; and Volume 6, Part 3, Chapter 7: Onshore Archaeology and Cultural Heritage.	The assessment presented in Volume 6, Part 2, Chapter 10: Seascape, Landscape and Visual concluded there would be no significant adverse effects in EIA terms. With respect to the project life cycle, there is scope for inter-related effects to arise related to seascape, landscape and visual effects in the construction, operation and decommissioning phases. Considering that long-term, yet reversible, effects are expected in the operational phase, with short-term effects in the construction and decommissioning phases, it is unlikely that the short-term effects will significantly add to the long-term effects over the whole project lifetime. Furthermore, the impacts relate to the presence of infrastructure, an effect which persists throughout the lifetime of the project until decommissioned. It can therefore be thought of as occurring within a single 'project lifetime' phase rather than in three discrete phases. It is therefore concluded that no inter-related effects of greater significance than those in isolation will occur. With regard to landscape and visual receptors, the assessment undertaken has included an extensive range of viewpoints at agreed locations around the adjacent coast. Using the most sensitive receptors throughout, combined with the MDS approach, the assessment therefore provides a fully

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
			comprehensive and representative assessment of the highest potential change from the current baseline conditions that could arise from the development of the project. The assessment undertaken is inherently inclusive of inter-relationships as it includes all aspects of the character of an area, including human activity, historic and cultural setting. The assessment considers all aspects as derived by the site photography and visualisations. It is therefore considered that no additional inter-related effects are likely to occur beyond those already identified.
Receptor-led effects			
There is potential for spatial and temporal interaction between the direct and indirect impacts to seascape, landscape and visual receptors outlined above. The greatest scope for potential inter-related impacts is predicted to arise through the interaction of impacts on the visual receptors, which could be historical in nature or have cultural significance to the surrounding area and known to be present within the Seascape, Landscape and Visual study area. With respect to this interaction, combined effects on visual receptors will vary temporally and spatially across the study area according to the activities being undertaken. Construction effects will cease upon completion of construction and will give way to operational phase effects which will be fully reversible when the 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. As stated above, the assessment of effects to seascape, landscape and visual receptors is inherently inclusive of inter-related effects.			

Table 3.8: Inter-related effects assessment – Offshore Archaeology and Cultural Heritage.

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
Project lifetime effects			
Construction, operation and decommissioning	Loss of archaeological receptors due to penetration, compression and scour effects	Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes; and Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage	The assessment concludes that these impacts across all phases were of negligible to minor adverse significance, which is not significant in EIA terms. There is limited scope for significant inter-related effects on archaeological resources as a result of the interactions between the impacts as any such effects will be avoided via the implementation of mitigation through Volume 9, Report 19: Written Scheme of Investigation (offshore). On that basis, it is considered that no additional inter-related effects of greater significance than those assessed in isolation will occur.
Construction and decommissioning	Loss of archaeological receptors due to compression and draw down effects		
Receptor-led effects			
There is the potential for spatial and temporal interactions between direct and indirect impacts to marine archaeological receptors. The scope for inter-related effects is predicted to arise through combined effects on different elements of the historic environment, and through direct physical impacts on heritage assets interacting with indirect impacts from sediment deposition which may lead to further damage to the same receptor via increased exposure. The mitigation measures proposed for VE, which includes the implementation of Archaeological Exclusion Zones (AEZs) to avoid sites of identified archaeological significance, will minimise combined effects on different elements of the historic environment. It is therefore predicted that any inter-related effect will not be of any greater significance than those already assessed in isolation.			

Table 3.9: Inter-related effects assessment – LVIA.

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
Project lifetime effects			
Construction, operation and decommissioning	Landscape and visual effects	Volume 6, Part 3, Chapter 2: Landscape and Visual Impact Assessment; and Volume 6, Part 3, Chapter 7: Onshore Archaeology and Cultural Heritage.	The assessment presented in Volume 6, Part 3, Chapter 2: Landscape and Visual Impact Assessment has predicted a series of effects on landscape and a number of viewpoints ranging from minor to major adverse significance. The major effects are considered significant in EIA terms. With respect to the project lifecycle, there is scope for inter-related effects to arise related to the landfall, onshore Export Cable Corridor and substation. However, the initial impacts from the construction will decrease in significance as the project moves into the operation phase. Decommissioning activities will incur impacts to landscape and visual receptors whilst plant is on site, however the effect is temporary as in the construction phase. With respect to landscape and visual receptors, the assessment undertaken has included a wide range of viewpoints at agreed locations in the study area. Using the most sensitive receptors throughout, combined with the MDS approach, the assessment provides a fully comprehensive and representative assessment of the highest potential change from the current baseline conditions that could arise from the development of the project. The assessment undertaken is inherently inclusive of inter-relationships as it includes all aspects of the character of an area, including historic setting, human activity and the local

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
			ecology. The subdivision of all receptors into specific types represents a focusing of impact assessment from the wider and inter-related consideration of the potential for the project to change the character and amenity of the region. This assessment considers all aspects as derived by the site photography and visualisations. It is therefore considered that no additional inter-related effects are likely to occur beyond those already assessed.
Receptor-led effects			
There is potential for spatial and temporal interaction between the direct and indirect impacts to landscape and visual receptors outlined above. The greatest scope for potential inter-related impacts is predicted to arise through the interaction of impacts on the visual receptors known to be present within the landscape and visual study area. With respect to this interaction, combined effects on visual receptors will vary temporally and spatially across the study area according to the activities being undertaken. Construction effects will cease upon completion of construction and will give way to operational phase effects which will be fully reversible when the 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.			

Table 3.10: Inter-related effects assessment – Onshore Biodiversity and Nature Conservation.

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
Project lifetime effects			
Construction, operation and decommissioning	Disturbance or damage to ecological features	Volume 6, Part 3, Chapter 4: Onshore Biodiversity and Nature Conservation Volume 6, Part 3, Chapter 2: Landscape and Visual Impact Assessment	The assessment presented in Volume 6, Part 3, Chapter 4: Onshore Biodiversity and Nature Conservation concludes that impacts are considered not likely to be significant. There is potential for inter-related effects to occur across the project lifetime, for example where the removal or disturbance of natural features could have an impact both on biodiversity and landscape receptors. These effects are most likely to occur in the construction and operation and maintenance phases and will largely be associated with the onshore substation rather than the onshore ECC or landfall as these areas will be reinstated following construction. As such, due to the recovery time between construction and decommissioning, no inter-related effects of greater significance than considered in isolation are predicted to arise from the landfall or onshore ECC. With regards to the onshore substation area the development of suitable mitigation measures will reduce or offset potentially significant effects for biodiversity and landscape receptors. For example, both chapters consider the mitigation of hedgerow and tree loss in respect of planting proposed as outline landscape mitigation principles. At this stage, further assessment of effects on ecology and nature conservation is subject to completion of ongoing
Construction and decommissioning	Temporary habitat loss/ disturbance		
	Accidental death and injury of ecological receptors		

Development phase	Nature of inter-related effect	Relevant ES documents	Inter-related assessment
			surveys that will be completed prior to the application. The outcomes of the final assessment will inform the development of mitigation measures which will reduce or offset potentially significant effects. As such, it is concluded that there is no potential for inter-related effects of greater significance than those considered in isolation.
Receptor-led effects			
The greatest scope for inter-related effects is expected to occur as a result of interactions between habitat loss/ disturbance effects and the impact upon landscape receptors such as hedgerows and agricultural land. This interaction may lead to effects of greater significance than the effects considered in isolation. With respect to this interaction, the potential for inter-related effects is greatest during construction and operation, however the consideration of proposed mitigation measures would reduce this potential. During decommissioning, if all project infrastructure is removed, effects will be similar to the construction phase, depending on the methods employed. As noted above, at this stage, the assessment of effects on ecology and nature conservation is subject to completion of ongoing surveys that will be completed prior to the application. The outcomes of the final assessment will inform the development of mitigation measures which will reduce or offset potentially significant effects.			

3.6 CONCLUSIONS

3.6.1 This chapter has defined the potential inter-related effects considered to arise from VE. This has enabled an assessment of the potential inter-related effects on a range of receptor groups to be completed. The assessment has been based on information drawn from the individual chapters of the ES, with the identification of potential inter-related effects being based on qualitative assessment and using expert judgement.

3.6.2 The assessment has been undertaken in compliance with the EIA Regulations and specific guidance produced by PINS, noting that inter-related effects have, in many cases, already been assessed either inherently or explicitly within the topic-specific chapters.

3.6.3 Overall, the inter-related effects assessment for VE has not identified any significant effects that are not already identified in the topic-specific chapters. The assessment has not identified any inter-related effects that are predicted to lead to effects of greater significance compared to those identified in isolation.

3.7 REFERENCES

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