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AQUIND INTERCONNECTOR

Environmental Statement – Volume 1 - Chapter 29 Cumulative Effects

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

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29. CUMULATIVE EFFECTS

29.1. INTRODUCTION

29.1.1.1. This chapter of the Environmental Statement ('ES') considers the likely significant cumulative effects that may arise from the construction, operation and decommissioning of the Proposed Development. The individual ES chapters present a cumulative effects assessment ('CEA') relevant to each topic, however this chapter aims to present a more complete overview of the potential cumulative effects of the Proposed Development.

29.1.1.2. When considered in isolation, the environmental effects of a particular activity on a single resource or receptor may not be significant. However, when individual effects are considered in combination with other effects (significant or insignificant) in the same area, occurring at the same time, the resulting cumulative effect may be significant.

29.1.1.3. There are two main types of cumulative effects which are considered as part of the Environmental Impact Assessment ('EIA') process:

- Intra-project effects: Also referred to as 'interrelationships between topics' (PINS, 2019). The interaction and combination of environmental effects, and indirect effects of the Proposed Development affecting the same receptor, either within the site or in the local area; and
- Inter-project effects: Also referred to as 'cumulative effects' (PINS, 2019). The interaction and combination of environmental effects of the Proposed Development with other development and activities affecting the same receptor.

29.1.1.4. In addition to intra-project and inter-project effects, Schedule 4 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('EIA Regulations 2017') requires that the description of likely significant effects should include those which are of a transboundary nature. Transboundary effects are those that may affect countries other than the country, or countries, in which a project will be constructed and operated. The potential for transboundary effects associated with the marine elements of the Proposed Development is considered in Section 29.7 below and within each marine topic chapter (Chapters 6 to 14). Transboundary effects are not considered for onshore topics (Chapters 15 to 26) as onshore effects of the Proposed Development are not considered to affect receptors outside of the UK. The Waste and Material Resources and Carbon and Climate Change Chapters (Chapters 27 and 28) have been treated as being both onshore and marine topics.

29.1.1.5. This cumulative effect assessment considers the capacity of environmental resources and receptors to accommodate changes that are likely to occur. It includes a consideration of the duration, extent, type (additive or synergistic), frequency, value and resilience of the receptor, and likely mitigation.

29.1.1.6. This chapter draws on the information presented in Chapters 6 to 28 of the ES Volume 1 (document reference 6.1.6 to 6.1.28) and should be read in conjunction with these chapters. It is supported by Appendix 29.1 (CEA Consultation) of the ES Volume 3 (document reference 6.3.29.1), Appendix 29.2 (Collated Onshore Long and Short List of Developments) of the ES Volume 3 (document reference 6.3.29.2), Appendix 29.3 (Marine Intra-Project Effects) of the ES Volume 3 (document reference 6.3.29.3) and Figures 29.1 to 29.6 of the ES Volume 2 (document reference 6.2.29.1 to 6.2.29.6). The figures present the developments considered within this Chapter under the following headings; Major Projects within the UK Marine Area, Major Aggregate Projects within the French Marine Area, Aggregate Projects within the UK Marine Area, Dredge and Disposal Projects within the UK Marine Area; Coastal Projects within the UK Marine Area and Onshore Short List of Developments.

29.2. LEGISLATION, POLICY AND GUIDANCE

29.2.1.1. There are a number of pieces of legislation, guidance and policy applicable to CEA. The following sections provide detail on the key international and UK legislation, policy and guidance relevant to CEA.

29.2.2. LEGISLATION

29.2.2.1. The requirement for CEA is stated in the following European and UK legislation:

- EIA Directive 85/337/EEC (as amended) on the assessment of effects of certain public and private projects on the environment requires an assessment of "*the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary positive and negative effects of the project*"
- Schedule 4 of the EIA Regulations 2017 requires that an environmental statement includes:

  "(5) A description of the likely significant effects of the development on the environment resulting from, inter alia –

  …(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;…

  …The description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary,

cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development."…

29.2.2.2. In line with the above, a description of the likely significant cumulative effects is provided in each onshore technical chapter of this ES and a description of both the likely significant cumulative and transboundary effects is provided in each marine technical chapter.

29.2.2.3. The United Nations Economic Commission for Europe ('UNECE') Convention on Environmental Impact Assessment in a Transboundary Context (known as the Espoo Convention) requires that assessments are extended across borders between Parties of the Convention when a planned activity may cause significant adverse transboundary impacts.

29.2.2.4. Regulation 32 of the EIA Regulations details the procedure for consulting on and addressing transboundary effects on other European Member States. The Planning Inspectorate ('PINS') Advice Note Twelve (PINS, 2018a) explains the legal context and the Nationally Significant Infrastructure Project ('NSIP') transboundary process (including special arrangements) that will be followed by PINS on behalf of the Secretary of State ('SoS'), during the pre-application, examination and recommendations stages of the Development Consent Order ('DCO') application.

29.2.3. POLICY

29.2.3.1. The CEA has been undertaken with specific reference to the relevant National Policy Statement ('NPS'), which are the principal decision-making documents for NSIP.

29.2.3.2. The Overarching NPS for Energy (EN-1) is most relevant to the Proposed Development and states in paragraph 4.2.5:

"When considering cumulative effects, the ES should provide information on how the effects of the applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been sought or granted, as well as those already in existence)".

29.2.3.3. The specific requirements of the NPS in relation to CEA and transboundary assessment, relevant to the Proposed Development, are summarised in Table 29.1.

Table 29.1 - NPS assessment requirements for CEA

NPS	NPS Reference	ES Reference
Information should be provided on how the effects of the applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been sought or granted, as well as those already in existence).	EN-1, paragraph 4.2.5	This is assessed in all technical assessment chapters (Chapter 6 – 28) within the ES.

NPS	NPS Reference	ES Reference
As described in the relevant sections of this NPS and in the technology specific NPSs, where the proposed project has an effect on human beings, the ES should assess these effects for each element of the project, identifying any adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate. The impacts of more than one development may affect people simultaneously, so the applicant and the IPC should consider the cumulative impact on health.	EN-1, paragraph 4.13.2	The cumulative impacts on health are considered in Chapters 26 (Human Health) and 25 (Socio-economics) and associated CEA appendices.
Consider and quantify the different types of flooding (whether from natural and human sources and include joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made.	EN-1, paragraph 5.7.5	Chapter 20 Surface Water Resources and Flood Risk
The ES should identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan.	EN-1, paragraph 5.10.5	The cumulative impacts of land use and the effects replacing an existing development or use of the site and the prevention of the development or use on a neighbouring site from continuing have been identified in chapters 25 (Socio-economics) and Chapter 17 (Soils and Agricultural Land Use)
If development consent were to be granted to for a number of projects within a region and these were developed in a similar timeframe, there could be some short-term	EN-1, paragraph 5.12.3	This has been considered in all CEA appendices and Chapter 29

NPS	NPS Reference	ES Reference
negative effects, for example a potential shortage of construction workers to meet the needs of other industries and major projects within the region.		Cumulative Effects (This Chapter).
"The IPC [now the Inspectorate] should consider how the accumulation of, and interrelationship between, effects might affect the environment, economy or community as a whole, even though they may be acceptable when considered on an individual basis with mitigation measures in place."	EN-1, paragraph 4.2.6	Chapter 29 Cumulative Effects (This Chapter)
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— **(e) the interaction between the factors referred to in sub-paragraphs (a) to (d).**	EIA Regulations (Regulation 5 (2))	Chapter 29 Cumulative Effects (This Chapter)

29.2.4. GUIDANCE

29.2.4.1. Topic specific guidance is detailed in the relevant chapters of the ES (Chapters 6 to 28). In addition the following guidance has been taken into consideration as part of the CEA, [As well as the below, guidance of relevance to CEA that has been used to guide the approach taken includes the Guideline for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission , 1999).]

PINS Advice Note Nine: Rochdale Envelope

29.2.4.2. PINS Advice Note Nine (PINS, 2018b) recognises that, at the time of the submission of the application, some project details will not be confirmed. This is due to a number of factors including; the evolution of technology, the need to maintain flexibility in commercial decisions and the requirement for further surveys (e.g. geophysical surveys prior to the installation of the marine cables to determine the final Marine Cable Route). Therefore, there is a requirement to maintain flexibility when describing and assessing the Proposed Development through the use of a design envelope.

29.2.4.3. 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 between aspect 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).

29.2.4.4. The potential cumulative impacts with other developments will also need to be carefully identified such that the likely significant effects can be shown to have been identified and assessed against the baseline position (which would include built and operational development). In assessing cumulative impacts, other development should be identified through consultation with the local planning authorities and other relevant authorities.

PINS Advice Note Twelve: Transboundary Impacts and Processes

29.2.4.5. PINS Advice Note Twelve (PINS, 2018a) sets out the procedures for consultation where a DCO application has the potential for significant transboundary impacts. The role of the Planning Inspectorate, UK Government and the applicant is described. The Advice Note advises that the potential for transboundary effects should be detailed in the ES.

PINS Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects

29.2.4.6. PINS Advice Note Seventeen (PINS, 2019) outlines the legal context and obligations of the Applicant to assess the cumulative effects of a Proposed Development as part of an application. The Advice Note outlines the recommended staged approach to CEA to ensure the consistent assessment of cumulative impacts.

29.2.4.7. Section 29.4 of this chapter provides further detail on the methodology and approach undertaken for the Proposed Development.

National Planning Policy Framework (NPPF)

29.2.4.8. The National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2019) requires that applications for planning permission be determined in accordance with the development plan, unless material considerations indicate otherwise. Decisions on applications should be made as quickly as possible, and within statutory timescales unless a longer period has been agreed by the applicant in writing.

29.2.4.9. However, in the context of the Framework – and in particular the presumption in favour of sustainable development – arguments that an application is premature are unlikely to justify a refusal of planning permission other than in the limited circumstances where both:

29.2.4.10. a) the development proposed is so substantial, or its cumulative effect would be so significant, that to grant permission would undermine the plan-making process by predetermining decisions about the scale, location or phasing of new development that are central to an emerging plan; and

29.2.4.11. b) the emerging plan is at an advanced stage but is not yet formally part of the development plan for the area.

EU Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions

29.2.4.12. The European Commission have produced guidelines which consider the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions within the Environmental Impact Assessment (EIA) process (European Commission, 1999).

29.2.4.13. The aim is to provide guidance on practical methods and approaches to assess indirect and cumulative impacts of a project as well as impact interactions. The Guidelines are not intended to be formal or prescriptive but are designed to assist EIA practitioners in developing an approach which is appropriate to a project, and to consider these impacts as an integral part of the EIA process.

Marine Management Organisation, A Strategic Framework for Scoping Cumulative Effects

29.2.4.14. The Marine Management Organisation (MMO) must ensure that cumulative effects are identified and assessed appropriately, alongside other evidence in its decision making. The strategic framework (Marine Management Organisation, 2014) aims to provide a consistent approach to the identification and consideration of cumulative effects that can be applied at the strategic level across all relevant MMO functions.

29.2.4.15. The framework is underpinned by an evidence database constructed during this work which identifies activities taking place in the marine environment, the pressures that they exert, and the receptors which may potentially be sensitive to those pressures.

Natural England, Development of a generic framework for informing Cumulative Impact Assessments related to Marine Protected Areas through evaluation of best practice

29.2.4.16. The document (Natural England, 2014) provides a detailed review and evaluation of methods for conducting Cumulative Impact Assessment (CIA) both within and beyond the marine environment. Building on this review, the study has developed a generic CIA framework, providing clear guidance on the process which could be adopted for robust and comprehensive CIA for all projects affecting Marine Protected Areas (MPAs).

Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report

29.2.4.17. The document (European Comission , 2017) provides practical insight to those who are involved during these stages in the EIA process, drawing upon experiences in Europe and worldwide.

29.2.4.18. The guidance notes that due to the complex nature of significance thresholds and criteria for the assessment of cumulative effects should be defined through a collaborative approach, involving all of the interested and affected parties in the process of data collection and analysis.

29.2.4.19. It also notes the need to make greater use of interdisciplinary perspectives and methods: e.g. network diagrams and models that identify the cause effect relationships which result in cumulative effects, trend analyses that identify historical, current and future trends for a given resource, and interactive matrices that consider the interactions of magnitude of the impacts assessed individually, Significance Criteria and Determination in Sustainability-Based Environmental Impact Assessment.

29.3. CONSULTATION

29.3.1.1. To date, consultation in relation to CEA has been conducted through topic specific workshops, the Scoping Report (AQUIND Limited, 2018) and the PEIR (AQUIND Limited, 2019). A summary of the consultation process is presented in Chapter 5 Consultation and in each individual technical chapter. Whilst individual responses are not captured within this chapter, they have been collated in the Consultation Report (document reference 5.1) which has been submitted as part of the Application.

29.3.1.2. Appendix 29.1 (CEA Consultation) presents the consultation responses relevant to CEA received from key stages of the DCO process. In addition, this information can also be found alongside all other topic specific consultation responses in each individual ES chapter and associated consultation appendix.

29.3.1.3. As discussed in Section 29.2, under the Espoo Convention (1991), where there is the potential for significant transboundary effects, the relevant European Economic Area

('EEA') Member States should be notified as early as possible. PINS provided transboundary notification to six EEA Member States (Spain, France, Belgium, Germany, Denmark and Netherlands) on 3 April 2019. One EEA state (Spain) confirmed their wish to participate in the examination of the application.

29.3.1.4. Appendix 29.1 (CEA Consultation) provides a summary of all consultation undertaken in relation to transboundary impact assessment. Further statutory transboundary consultation will be undertaken by PINS in accordance with Regulation 32 of the EIA Regulations, if and when PINS accepts this application for a DCO.

29.4. ASSESSMENT METHODOLOGY

29.4.1.1. The proposed method for the assessment of potential cumulative effects takes into account the above legislation, policy and guidance, and the consultation responses received to date.

29.4.1.2. PINS Advice Note Seventeen (PINS, 2019) sets out a recommended approach to the CEA process in the absence of a single, agreed industry standard method for NSIPs. The advice note details a four-staged approach, as set out in Table 29.2.

Table 29.2 – The CEA Stages

CEA Stage	Activity
Stage 1 – Establishing the long list of 'other existing development and/or approved development*'	Identify a long list of other development that is proposed in the vicinity of the Project*. Establish a ZOI for the individual environmental topics of the EIA.
Stage 2 – Establishing a shortlist of 'other existing development and/or approved development*'	Identify the nature of the other development and assess whether there is the potential for significant cumulative effects based upon the potential for temporal overlap and the nature and scale of the other development.
Stage 3 – Information gathering	Collate information on the shortlist of other development identified at Stage 2.
Stage 4 – Assessment	Review each of the shortlisted other developments to assess whether cumulative effects may arise. Mitigation measures should be identified where adverse cumulative effects are predicted.

*Terminology from PINS (2019) used, referred to as Proposed Development in this ES.

29.4.1.3. Whilst the outcome of the CEA for the onshore and marine elements of the Proposed Development is presented separately in Section 29.5, both follow the PINS approach set out below.

29.4.1.4. Stage 1 of the CEA process requires the identification of a long list of projects and plans (or 'other developments') that should be considered for the CEA. PINS Advice Note Seventeen (PINS, 2019) provides guidance on how the plans and projects should be considered based on their development status and the availability of information available. The guidance recommends a tiered approach to determine the relevance of other projects and plans for inclusion in the CEA. This approach is summarised in Table 29.3.

Table 29.3 – Summary of the tiered approach to the consideration of 'other developments' (PINS, 2019)

Tier	Description	
1	Developments that are under construction	
	Permitted applications, not yet implemented	
	Submitted applications, not yet determined	
2	Projects listed on PINS Programme of Projects, where a Scoping Report has been submitted.	**Decreasing level of detail likely to be available.**
3	Projects listed on PINS Programme of Projects, where a Scoping Report has not been submitted.	
	Development identified in the relevant Development Plans (and emerging Development Plans), with weight given as they move closer to adoption and recognising that much information on any relevant proposals will be limited.	
	Developments identified in other plans and programmes which set the framework for future development consents/approvals, where such development is likely to come forward.	

29.4.1.5. Table 29.4 provides examples of the types of plans and projects that are likely to be taken into consideration for the CEA.

Table 29.4 – Plans and projects considered in the CEA

Onshore Plans and Projects	Marine Plans and Projects
Other energy generation infrastructure	Other subsea energy generation infrastructure
Building/housing developments	Aggregate extraction
Public highway developments	Offshore disposal sites
Coastal protection and flood defence works	Coastal works, cables and pipelines
Cable and pipeline works	Oil and gas activities

29.4.2. SIGNIFICANCE OF CUMULATIVE AND TRANSBOUNDARY EFFECTS

29.4.2.1. PINS Advice Note Seventeen (PINS, 2019) states that:

"*The significance criteria used to assess likely cumulative effects should consider the capacity of environmental resources and receptors to accommodate changes that are likely to occur.*"

29.4.2.2. Where relevant, the generic significance of effects matrix that is presented in Chapter 4 (EIA Methodology) of the ES Volume 1 (document reference 6.1.4) will be used for the CEA and transboundary assessment. Where this is not the case, the methodology stated within the relevant topic chapters will be used.

29.4.2.1. There is no standard prescriptive method for assessing cumulative or transboundary effects. The extent to which the effects of other developments can be assessed quantitatively depends on the level of information available about the other developments. Where environmental assessment information regarding other developments is not available or uncertain, the assessment is necessarily qualitative.

29.4.2.2. Where significant cumulative effects have been identified as having the potential to arise as a result of activities during the construction, operation and decommissioning of the Proposed Development, these are identified in Section 29.5.

29.4.3. ASSESSMENT APPROACH

29.4.3.1. The scope of the CEA has been informed through stakeholder consultation and feedback received from the EIA Scoping Report and PEIR. As stated above, the CEA follows the guidelines and staged approach as detailed in PINS Advice Note Seventeen (PINS, 2019).

29.4.3.2. The EIA Scoping Report (AQUIND Limited, 2018) presented an overview of the proposed approach to CEA and included an initial list of developments that had the potential to create cumulative effects with the Proposed Development. The PEIR developed the CEA in undertaking Stage 1 and 2 of the CEA process for both marine

and onshore environmental topics. This chapter of the ES further develops the CEA in undertaking Stages 3 and 4 of the process.

29.4.4. STAGE 1 – ZOI AND LONG LIST

29.4.4.1. The ZOI has been identified for construction and operation based on the predicted extent of the likely significant effects that could reasonably arise from other developments alongside the Proposed Development. The ZOI for each environmental topic is listed in Table 29.5 and varies for each environmental topic, based on professional judgement and experience with similar developments. Where the ZOI is different for construction and operational impacts, the largest has been used when sifting projects from Stage 1 to Stage 3.

29.4.4.2. For onshore environmental topics, the majority of study areas for each of the individual environmental topic assessments are 1 km or less, in so far as they relate to potential cumulative effects. Where study areas are wider, any additional schemes submitted through consultation, were considered on a case by case basis, topics where this is the case are highlighted in Table 29.5.

Table 29.5 - ZOI for each Environmental Topic

Environmental Topic	Stage of Development	ZOI
Physical Processes	Construction, decommissioning and operation (including repair and maintenance) of Marine Cable Route	25 km from the Marine Cable Corridor.
Marine Water and Sediment Quality	Construction and operation (including repair and maintenance) of the Marine Cable Route and Landfall	KP 0 – KP 21: 5 km either side Marine Cable Corridor. Beyond KP 21 to the EEZ boundary line: 25 km from the Marine Cable Corridor
Intertidal and Benthic Habitats	Construction, decommissioning and operation (including repair and maintenance) of Marine Cable Route	KP 0 – KP 21: 10 km from the Marine Cable Corridor. Beyond KP 21 to the EEZ boundary line: 25 km from the Marine Cable Corridor
Fish and Shellfish	Construction, decommissioning and operation (including repair and maintenance) of Marine Cable Route	25 km from the Marine Cable Corridor.
Marine Mammals and	Construction, decommissioning and operation (including repair and	5 km from the Marine Cable Corridor and 5 km from other cumulative projects that may

Environmental Topic	Stage of Development	ZOI
Basking Sharks	maintenance) of Marine Cable Route	generate underwater noise.
Marine Ornithology	Construction, decommissioning and operation (including repair and maintenance) of Marine Cable Route	10 km from the Marine Cable Corridor.
Commercial Fisheries	Construction, decommissioning and operation (including repair and maintenance) of Marine Cable Route	The Study Area within 12 nautical mile ('nmi') limit
Shipping, Navigation and Other Marine Users	Construction, decommissioning and operation (including repair and maintenance) of Marine Cable Route	9.25 km (5 nautical miles) from the Marine Cable Corridor.
Marine Archaeology	Construction, decommissioning and operation (including repair and maintenance) of Marine Cable Route	Spatial extent of the Marine Cable Corridor.
Landscape and Visual	Construction and operation of the Converter Station	8 km (from Converter Station)
	Construction of Onshore Cable Route and Landfall	120 m (Onshore Cable Corridor) 300 m (Landfall)
Onshore Ecology	Construction and operation of the Converter Station	DCO projects and strategic linear infrastructure or coastal defence projects that could intersect with Natura 2000 sites and their qualifying features – 10km zone of influence. Strategic linear infrastructure or coastal defence projects that could intersect with other statutory designated sites and their qualifying features – 2 km zone of influence. Large-scale residential (>100
	Construction and Operation of the Onshore Cable Route and Landfall	

Environmental Topic	Stage of Development	ZOI
		dwellings) or commercial developments, non-strategic infrastructure projects – 2 km zone of influence. All other developments – 100 m zone of influence.
Soils and Agricultural Land Use	Construction and operation of the Converter Station Construction of Onshore Cable Route and Landfall	Soils: Order Limits Farm holdings: Full extent of the farm holdings affected by the proposed development
Ground Conditions	Construction and operation of the Converter Station Construction of Onshore Cable Route and Landfall	500 m
Groundwater	Construction and operation of the Converter Station Construction of Onshore Cable Route and Landfall	Areas directly above the proposed cable route
Surface Water Resources and Flood Risk	Construction and operation of the Converter Station Construction of Onshore Cable Route and Landfall	1 km (to include areas deemed to be sensitive, typically 500 m)
Heritage and Archaeology	Construction and operation of the Converter Station Construction of Onshore Cable Route and Landfall	2 km (Converter Station) 500 m (Landfall). Above ground built heritage setting impacts have been scoped out along the cable route

Environmental Topic	Stage of Development	ZOI
Traffic and Transport	Construction of the Proposed Development	The study area encompasses an approximate 5 km area around the Order Limits, incorporating Denmead, Southwick and Cosham to the west and the A3(M) corridor to the east, between Junction 1 (Horndean) and where it meets the A27 (Bedhampton). To provide a robust assessment the study area includes all of Portsea Island and motorway between M27 Junction 12 to the west and A27 junction with A3(M) to the east (see Chapter 22 (Traffic and Transport) of the ES Volume 1 (document reference 6.1.22) for further detail).
Air Quality	Construction of Converter Station and Onshore Cable Route and Landfall	Human receptors: 350 m from Order Limits and 50 m radius from construction routes Ecological receptors: 50 m radius of the Order Limits and 50 m radius from construction routes
Noise and Vibration	Construction and operation	1 km from the Order Limits
Socio-economics	Construction and operation	1 km from the Order Limits
Human Health	Construction and operation of the	The areas administered by

Environmental Topic	Stage of Development	ZOI
	Converter Station Construction of Onshore Cable Route and Landfall	EHDC, HBC, PCC and WCC
Waste and Material Resources	Construction and operation of the Converter Station Construction of Onshore Cable Route and Landfall	Within the Order Limits
Carbon and Climate Change	It is not considered appropriate to include this topic in cumulative assessment. As detailed in Chapter 28 (Carbon and Climate Change) of the ES Volume 1 (document reference 6.1.28), GHG emissions are not restricted to geographical area.	

29.4.4.3. An initial spatial screening exercise was undertaken to identify potential developments within the ZOI of the Proposed Development for each environmental topic, and to consider the potential for inter-project cumulative effects to arise. PINS Advice Note Seventeen (PINS, 2019) states "*The scale and nature of NSIPs will typically dictate a broad spatial and temporal zone of influence (ZOI) for an NSIP…*"

29.4.4.4. A long list of developments was presented in the PEIR (AQUIND Limited, 2019) for both marine and onshore topics based on the identified ZOIs at the time. Projects and plans were sourced from the PINS Programme of Projects, relevant LPA planning portals, the MMO's Marine Information Systems and The Crown Estate's maps and GIS database. The long list includes developments which have been submitted in the planning and DCO system and that are awaiting decision; projects that have been granted/ withdrawn (within 12 months), and projects under construction (classified as Tier 1 developments (PINS, 2019)). In order to ensure a meaningful CEA, only developments which are reasonably well described and sufficiently advanced have been considered. Where any developments are identified and screened out, justification is provided.

29.4.4.5. The long list of developments is presented in a table matrix appended to each technical chapter of the ES (Chapters 6 to 28) and in Appendix 29.2. The matrix follows the approach recommended by PINS in Appendix 1 of PINS Advice Note Seventeen (PINS, 2019).

29.4.5. STAGE 2 – SHORT LIST.

29.4.5.1. The long list of developments identified as part of Stage 1 was further screened through the gathering of additional information, to identify the developments with the potential to lead to significant cumulative effects in relation to environmental topic and temporal scope.

Marine

29.4.5.2. For marine Chapters 6-14, the locations of projects within this long list are illustrated in Figures 29.1 to 29.5. This long list was agreed with the Marine Management Organisation ('MMO') and further updates were made to the list in October 2019. The long list of projects presented in each appendix to those chapters was refined as follows:

- Firstly, a spatial assessment was conducted. Any project identified in the long list of projects falling within the ZoI was screened in for further consideration; and,
- A temporal, scale and nature-based assessment was then conducted for those projects where a potential spatial overlap was identified.

29.4.5.3. Only four of the marine chapters identified projects which required Stage 3 and 4 assessment, Chapter 6 (Physical Processes), Chapter 9 (Fish and Shellfish), Chapter 12 (Commercial Fisheries) and Chapter 13 (Shipping, Navigation and Other Marine Users) (document references 6.1.6, 6.1.9, 6.1.12 and 6.1.13).

29.4.5.4. Chapter 6 (Physical Processes) assessed the impacts on receptors shown in Table 29.6 during construction, operation and decommissioning. A summary of the CEA for Physical Processes is presented in Table 29.10 below.

Table 29.6 - Chapter 6 impacts to be assessed cumulatively

Stage	Impact	Receptor
Construction, Operation and Decommissioning	Increased suspended sediment concentration (SSC)	Sediment transport regime
Construction (and Decommissioning)	Morphological changes, alteration of bedforms and obstruction to flows	Hydrodynamic regime

29.4.5.5. Chapter 9 (Fish and Shellfish) assessed the impacts on receptors shown in Table 29.7 during construction and decommissioning. It was concluded that there was no potential for significant cumulative impacts to arise during the operational stage of the Proposed Development and therefore these have been discounted. A summary of the CEA for Fish and Shellfish is presented in Table 29.11.

Table 29.7 - Chapter 9 Fish and Shellfish - impacts to be assessed cumulatively

Stage	Impact	Receptor
Construction (and Decommissioning)	Temporary Habitat disturbance/loss	Herring
Construction (and Decommissioning)	Temporary increase in SSC and smothering	Herring
Construction (and Decommissioning)	Noise and vibration	Herring

29.4.5.6. Chapter 12 (Commercial Fisheries) assessed the impacts on receptors shown in Table 29.8 during construction, operation (including repair and maintenance) and decommissioning. A summary of the CEA for Commercial Fisheries is presented in Table 29.12.

Table 29.8 - Chapter 12 Commercial Fisheries - impacts to be assessed cumulatively

Stage	Impacts	Receptor
Construction (and decommissioning)	Temporary loss or restricted access to established fishing grounds	UK Inshore Fleet
	Temporary displacement of fishing activity into other areas	
	Interference to normal fishing activities	
	Navigational safety issues for fishing vessels	
	Temporary increases in steaming times	
	Obstacles on the seabed	
Operation (and maintenance and repair)	Complete/temporary loss or restricted access to established fishing grounds	
	Complete/temporary displacement of fishing activity into other areas	
	Obstacles on the seabed after maintenance/repair	

29.4.5.7. Chapter 13 (Shipping, Navigation and Other Marine Users) assessed the impacts on receptors shown in Table 29.9 during construction, operation (including repair and maintenance) and decommissioning). A summary of the CEA for Chapter 13 (Shipping, Navigation and Other Marine Users) is presented in Table 29.13 below.

Table 29.9 - Chapter 13 Shipping, Navigation and Other Marine Users - impacts to be assessed cumulatively

Stage	Impact	Receptor
Construction (and Decommissioning)	Increased collision risk	Passing Traffic
Construction (and Decommissioning)	Disruption to vessel routing	Passing Traffic
Construction (and Decommissioning)	Disruption to port arrivals/departures	Recreational, angling and fishing vessels
Construction (and Decommissioning)	Disruption to vessel activities	Recreational, angling and fishing vessels

29.4.5.8. All other marine chapters concluded that the projects that were short-listed in the Stage 2 assessment would not give rise to significant cumulative effects and therefore these projects were not carried forward for Stage 3 and 4 assessment. Further details on those conclusions can be found within the individual chapters and appendices (Chapters 6 – 14).

Onshore

29.4.5.9. For onshore Chapters 15-26, the developments on the long list were screened based on distance, size and nature of the development. Consideration of temporal scope included construction, operation and decommissioning programmes to establish whether there is overlap and any potential for interaction. In addition to the ZOI, the following threshold criteria has been applied:

- Temporal scope: construction would need to happen concurrently or fall within 1 year of the programmed construction of the Proposed Development for cumulative construction effects with it to be assessed.
- The scale and nature of other development: projects greater than 0.5 ha, used as a threshold for likely significant effects in Schedule 2 of the EIA Regulations. However, it is also acknowledged that some projects under this threshold may give rise to cumulative effects, so projects within 100 m of the Site Boundary are included in the short list due to their proximity to the Proposed Development.

Summary of Short Listed Developments (Marine and Onshore)

29.4.5.10. The short list of developments for both the Marine and Onshore CEA was presented in the PEIR (AQUIND Limited, 2019) and has been reviewed to include new projects and updates to existing developments in the marine and onshore planning systems

and in line with feedback received during consultation. The project list has been updated for the ES as of information available in October 2019.

29.4.5.11. The short list of developments taken forward for Stage 3 and Stage 4 assessment in this CEA is provided in the table matrix appended to each technical chapter and the assessment summarised in Tables 29.10 – 29.14. The developments for marine topics are illustrated in Figures 29.1 – 29.5 and for onshore topics is illustrated in Figure 29.6.

29.4.6. STAGE 3 AND 4 – INFORMATION GATHERING AND ASSESSMENT

29.4.6.1. For each environmental topic, the short list of developments identified has been filtered to identify those developments within their topic specific ZOI that have the potential to cause cumulative effects.

29.4.6.2. Significant cumulative effects that have been identified as having the potential to arise during the construction, operation and decommissioning of the Proposed Development (onshore and marine) are summarised in Table 29.10 (Physical Processes), 29.11 (Fish and Shellfish) and 29.12 (Commercial Fisheries) and 29.13 (Shipping, Navigation and Other Marine Users).

29.4.6.3. For some of the developments, relevant information to inform this assessment has not been available or has been limited in nature, due to the stage of the project. As a result, some assessment conclusions have been based upon assumptions and professional judgement.

29.4.6.4. The assessment in Chapter 28 (Carbon and Climate Change) considers the cumulative effect of all greenhouse gas ('GHG') causing human activities that cause climate change, and therefore the assessment of the GHGs due to the Proposed Development implicitly assesses the cumulative effect of GHG emissions. Therefore, the quantification of emissions from the Proposed Development in the assessment of significance or effects inherently assesses the combined and cumulative effects. No further assessment has therefore been undertaken in this chapter.

29.5. ASSESSMENT OF LIKELY SIGNIFICANT INTER-PROJECT CUMULATIVE EFFECTS

29.5.1. MARINE

29.5.1.1. The assessment of cumulative effects in relation to the marine environment is included within each of the marine ES technical chapters (Chapters 6 to 14). Table 29.10 (Physical Processes), 29.11 (Fish and Shellfish), 29.12 (Commercial Fisheries) and 29.13 (Shipping and Navigation) below summarise the developments which fall within each marine environmental topic's ZOI for which potential cumulative effects were identified.

29.5.2. ONSHORE

29.5.2.1. The assessment of cumulative effects in relation to the onshore environment is included within each of the onshore ES technical chapters (Chapters 15-26). Table 29.14 provides a summary of the developments which fall within each onshore environmental topic's ZOI for which significant cumulative effects were identified.

29.5.3. SUMMARY

29.5.3.1. Tables 29.10 to 29.13 summarise the detailed cumulative effects assessment undertaken for shortlisted projects identified within Chapter 6 (Physical Processes), Chapter 9 (Fish and Shellfish), Chapter 12 (Commercial Fisheries) and Chapter 13 (Shipping, Navigation and Other Marine Users) of the ES. The assessments for each of these chapters did not identify any significant cumulative effects in the marine environment.

29.5.3.2. In terms of onshore developments, potential significant cumulative effects have been identified for onshore ecology, landscape and visual amenity and waste and materials topics during construction and just landscape and visual amenity during operation.

Table 29.10 - Summary of cumulative assessment - Chapter 6 (Physical Processes) (ID nos. reflect those shown in Appendix 6.4 (Physical Processes Cumulative Assessment Matrix) of ES Volume 3 (document reference 6.3.6.4) and in Figures 29.1-29.5)

ID No.	Tier	Project Name and Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
Construction (and Decommissioning)					
1	2	AQUIND Interconnector (France)	**Increased SSC** Similar activities are required during the construction of the components of the Project in France and French Marine EEZ. If construction activities in UK and French waters coincide potential cumulative effects from the liberation of sediments into suspension from multiple activities occurring coincidently could potentially result in enhanced SSC across the area. Dredge disposal activities which are considered to result in the greatest magnitude and extent of increased SSC, should they occur at the same time, are of significant distances apart (i.e. greater than 50 km) that they are not predicted to act cumulatively. Thus, as the impacts are considered to be localised, temporary and	None	**Not Significant**

ID No.	Tier	Project Name and Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
			relatively short duration, the cumulative effects related to enhanced SSC are considered to be of **low** magnitude and thus of **minor adverse** significance.		
7	1	IFA2	**Increased SSC** The possibility exists that construction activities for the Proposed Development may overlap with maintenance activities of the IFA2 interconnector only. If these activities coincided, potential cumulative effects could include the liberation of sediments into suspension from multiple activities occurring coincidently, enhancing SSC across the area. It was concluded within the ES for IFA2 that suspended fine sediments would only remain in suspension over the period of a few hours to days. If coincident activities were conducted which were likely to liberate fine sediments at the same time, in the same spatial region, enhanced levels of SSC would be observed.	None	**Not Significant**

ID No.	Tier	Project Name and Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
			However, the sediment plumes generated would be transient and as most impacts are considered to be localised, temporary and of short duration, the cumulative effects related to enhanced SSC are considered to be of **low** magnitude and thus of **minor** significance. However, were activities both located in the nearshore region, where there is a greater presence of fine sediments in the surficial sediment along the cable route the effects of cumulative enhanced SSC would be considered to be of **medium** magnitude and thus of **minor to moderate** significance		
1	2	AQUIND Interconnector (France)	**Effects on the Hydrodynamic ('HD') regime and morphological change/obstruction of flows** Other potential cumulative effects on the HD regime and morphological change could potentially occur due to the cumulative effect of cable protection (and other structures on the seabed) on the local flow field. However as predicted impacts are local to the structures on	None	**Not Significant**
7	1	IFA2			

ID No.	Tier	Project Name and Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
			the seabed, potential cumulative effects are considered to be **negligible** magnitude and thus of **negligible** significance.		
Operation (including Repair and Maintenance)					
1	2	AQUIND Interconnector (France)	**Increased SSC** There is potential that there could be temporal overlap of operational activities between the two projects including for cable repair/replacement. However, such activities will result in SSC increases which are of low magnitude, small extent and short duration (days to weeks), and therefore it is predicted that any cumulative effects are of **minor significance**.	None	**Not significant**

Table 29.11 – Summary of cumulative effects –Chapter 9 (Fish and Shellfish) (ID nos. are shown in Appendix 9.2 (Fish and Shellfish Cumulative Assessment Matrix) of ES Volume 3 (document reference 6.3.9.2) and illustrated in Figures 29.1- 29.5)

ID	Tier	Project Name and Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
Construction (and Decommissioning)					
1	2	AQUIND Interconnector (France)	**Temporary Habitat Disturbance/Loss:** The total potentially disturbed area for all projects considered is 85.5 km^2 which equates to a tiny percentage (1.1%) of the area identified as having spawning potential in the South Marine Plan) It is important to note that this temporary disturbed area is considered to be highly conservative as it assumes disturbance over the entire aggregate areas. In reality, the disturbed area will be substantially less as aggregate dredging will only occur in discrete areas within each site at any one time, and the UK aggregate licenses have a range of restrictions in place prevent operations over the herring spawning season. In light of the small spatial extent disturbed by all projects combined within the herring spawning area the effect on herring is considered to be **not significant.**	None	**Not significant**
7	1	IFA2			
22	1	DEME Area 478			
23	1	Volker Area 461			
24 and 25	1	Hanson Areas 473, 474 and 475			
32	1	Saint Nicolas West aggregate			
33	1	Saint Nicolas East aggregate			

ID	Tier	Project Name and Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
1	2	AQUIND Interconnector (France)	**Temporary increases in SSC (and smothering):** A conservative estimate is that the highest levels of SSC, and therefore potentially most disturbing to gravid herring will be within a 500 m radius of the vessels (1000 m diameter). This gives a combined area of 10.27 km^2 (0.79 km^2 around each vessel). This combined area is considered to be tiny in the context of the total spawning area, and the areas of elevated SSC only represent just tiny percentage of the higher larval density sub-rectangles. It should be noted, however that these areas of elevated SSC are temporary with plume modelling for the Proposed Development predicting a return to background levels within days. In addition, the area of elevated SSC considered is highly conservative as restrictions are in place during herring spawning periods for aggregate dredging at Areas 478, 473, 474, 475 and 461 (and therefore plumes of SSC from these areas will not occur over these spawning periods). Therefore, the cumulative effects of increased SSC from all projects on spawning	None	**Not significant**
7	1	IFA2			
22	1	DEME Area 478			
23	1	Volker Area 461			
24 and 25	1	Hanson Areas 473, 474 and 475			
32	1	Saint Nicolas West aggregate			
33	1	Saint Nicolas East aggregate			

ID	Tier	Project Name and Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
			herring (larvae and eggs) is predicted to be **not significant.** Sediment deposition, unlike suspended sediment which drifts with the prevailing currents, is more localised as heavier fractions fall from suspension rapidly. As the areas of greatest sediment deposition from each project are smaller, the total area of the available herring spawning affected will be less. It is unlikely that eggs and larvae will survive the in areas subject to greatest levels of sediment deposition directly below (and within a few hundred metres) from a disposal vessel. The plume modelling undertaken for the Proposed Development identifies that sediment deposition is temporary and transient with redistribution by tidal forcing. However, on a precautionary basis it is assumed that all eggs and larvae in the area of sediment deposition will not survive. It should be noted however that the total areas for all projects combined is small (smaller than that assessed for SSC) and when considered in relation to the areas of high spawning potential,		

ID	Tier	Project Name and Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
			the potential impacted area will be tiny. In light of this and although a cumulative effect on herring spawning, eggs and larvae exists, the spatial extent and magnitude of effect is considered to be small and is considered to be **not significant.** At Landfall, the levels of SSC and sediment deposition are expected to be negligible to those levels assessed for the Marine Cable Corridor. This area is also well outside the herring spawning grounds so no cumulative effects on herring are predicted at the Landfall or from construction activities undertaken for Landfall.		
1	2	AQUIND Interconnector (France)	**Noise and Vibration:** Given the information provided in Section 9.7.4, of Chapter 9 (Fish and Shellfish) the levels of underwater noise produced by these projects individually will not cause mortality or injury to herring. However, in the unlikely event that all projects were constructing/dredging at the same time, the potential for a cumulative effect may exist. However, it is considered that given the distance between each project, an additive	None	**Not significant**
7	1	IFA2			
22	1	DEME Area 478			
23	1	Volker Area 461			
24 and 25	1	Hanson Areas 473, 474 and 475			

ID	Tier	Project Name and Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
32	1	Saint Nicolas West aggregate	effect would not be created (i.e. higher combined noise level) but simply pockets of elevated noise around each operation. Furthermore, the licenced UK aggregate dredging sites have timing restrictions to avoid key spawning periods, and therefore, will not act cumulatively with the Proposed Development. Although these levels of underwater noise may result in some mild avoidance behaviour by herring, no injury or mortality is expected. As elevated noise levels are low in magnitude and highly localised the cumulative effect will be **not significant**. At landfall, Horizontal Directional Drilling ('HDD') and vibro-hammering and pile driving of casings and trestles at the exit/entry point will create a degree of underwater noise. However, the levels of noise predicted are low and these works are outside herring spawning areas so cumulative effects on herring are predicted to be **not significant**.		
33	1	Saint Nicolas East aggregate			

Table 2912 – Summary of cumulative assessment - Chapter 12 (Commercial Fisheries) (ID nos. are shown in Appendix 12.3 (document reference 6.3.12.3) and illustrated in Figures 29.1 - 29.5)

ID no	Tier	Project Name/ Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
Construction (and Decommissioning)					
13 14 15 16 17 18 19 20 21 26 27 28 29 30 31	1	Various Aggregate dredging projects (Refer to the specified Aggregate dredging projects (identified by ID numbers) listed in Appendix 12.3 (Commercial Fisheries Cumulative Assessment Matrix) of ES Volume 3 (document reference 6.3.12.3) and Figures 29.2 and 29.3**)**	**Temporary loss or restricted access to established fishing grounds** The cumulative effect of temporary loss or restricted access to fishing grounds for potters, gill netters, longliners and demersal trawlers is **minor to moderate** and for the scallop dredging vessels it is **negligible**. **Temporary displacement of fishing activity to other areas** The cumulative effect of displacement of fishing vessels for potters, gill netters, seine netters longliners and demersal trawlers is **minor to moderate** significance and for the scallop dredging vessels it is **negligible** significance. **Interference to normal fishing activities** The cumulative effect of interference to normal fishing practices is considered to be **minor to moderate** significance for potters, gillnetters and longliners as they are static and **negligible** significance for inshore scallop	None	**Not significant**

ID no	Tier	Project Name/ Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
35 36	1	NAB Tower Disposal Site & Treloar Hole Disposal Site	dredgers and demersal trawlers as gear is towed and can therefore avoid this effect. **Navigational safety issues for fishing vessels** The cumulative effects on navigational safety issues for fishing vessels remains as **tolerable (moderate risk).** **Temporary increases in steaming times** The cumulative effect of temporary increases in steaming times is **negligible** significance for the inshore fleet. **Obstacles on the sea bed** The cumulative effect of obstacles on the seabed for the inshore feet is of **negligible** significance for both the static gear (pots, gill nets, seine nets and longlines) and also **tolerable (moderate risk)** for towed gear vessels (scallop dredgers and demersal trawls). There will be no cumulative effect from exposed cable as the cumulative projects considered are for dredging and disposal only.		
65	1	IFA 2 & South Hayling Beach Management Plan			
7 11 6	1	Other sites			

ID no	Tier	Project Name/ Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
Operation (incl. Repair and Maintenance)					
13 14 15 16 17 18 19 20 21 26 27 28 29 30 31	1	Various Aggregate dredging projects (Refer to the specified Aggregate dredging projects (identified by ID numbers) listed in Appendix 12.3 (Commercial Fisheries Cumulative Assessment Matrix) and Figures 29.2 and 29.3))	**Complete/temporary loss or restricted access to established fishing grounds** The cumulative effect of complete/temporary loss or restricted access to established fishing grounds is **minor to moderate** for the UK inshore fleet apart from the scallop fleet which is negligible as their fishing grounds does not overlap the boundaries of the cumulative project considered. **Complete/temporary displacement of fishing activity to other areas** As this effect is linked to complete/temporary loss or restricted access to established fishing grounds the significance is therefore **minor to moderate** for the UK inshore fleet. **Obstacles on the seabed** The cumulative effect of obstacles on the seabed for the inshore feet are of **negligible** significance for both the static gear (pots, gill nets, and longlines) and also **Tolerable (moderate)** for towed gear vessels (scallop dredgers and demersal trawls).	None	**Not significant**
35 36	1	NAB Tower Disposal Site & Treloar Hole Disposal Site			
65	1	ABP Southampton Maintenance Dredge Licence – Nab Channel			

ID no	Tier	Project Name/ Reference	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
7 11 6	1	IFA 2 & South Hayling Beach Management Plan			

***Note – Refers to the specified Aggregate dredging projects (identified by ID numbers) listed in Appendix 12.3 (Commercial Fisheries Cumulative Assessment Matrix) and Figures 29.2 and 29.3**

Table 29.13 - Summary of cumulative assessment – Chapter 13 (Shipping, Navigation and Other Marine Users) – ID nos. reflect those shown in Appendix 13.2 (document reference 6.3.13.2) and in Figures 29.1-29.5

ID	Tier	Project Name	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
Construction (and Decommissioning)					
7	1	IFA 2	There is not expected to be any overlap in construction periods as installation of the Proposed Development is not anticipated to start until 2021 when the IFA-2 Interconnector will be operational. However, there may be an increase in collision risk and/or disruption to vessel routeing if maintenance/repair works are required over the IFA-2 cable whilst construction works for the Proposed Development are ongoing. If both operators follow best practice guidelines (i.e. issuing of Notice to Mariners (NtM), liaison with Langstone Harbour, QHM Portsmouth and ABP Southampton etc.), the cumulative effects are not	Issuing NtM, liaison with local ports	**Not significant**

ID	Tier	Project Name	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
			anticipated to be significant, due to the temporary nature of the works, and therefore effects are ranked as **tolerable** (**moderate risk**).		
117 & 121	1	RNLI Portsmouth Lifeboat Station & Fraser Range	The RNLI Portsmouth Lifeboat station is undergoing maintenance works over a ten-year period that continues until May 2027. Similarly, the Fraser Range development includes creation of a rock revetment and improvements to the existing sea wall to be undertaken prior to July 2022. Due to the close proximity of both projects, there may be increased disruption to vessel navigation (e.g. vessel routeing) in the area if works requiring vessels were to occur at the same time as the cable installation. In addition, disruption to port arrivals and departures (Langstone Harbour) may also be increased if construction periods overlapped. However, these cumulative effects are expected to be minimal due to the small scale and temporary nature of the works and thus ranked as **tolerable** (**moderate risk**)	None	**Not significant**
116 & 120	1	South Hayling Beach Management Plan & Southsea Coastal Flood	Any works associated with the South Hayling Beach Management Plan and Southsea Coastal Flood and Erosion Scheme, may cause a small cumulative effect if the works overlap the construction of the Proposed Development due to the close proximity of the projects including increased vessel to vessel collision risk due to	None	**Not significant**

ID	Tier	Project Name	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
		and Erosion Management Scheme	the presence of a number of large, slow moving vessels in the area; disruption to vessel routeing within coastal waters in particular, and disruption to small craft activities such as fishing, recreational sailing and recreational angling. The Hayling Beach works are currently scheduled to end in 2022, however works are only undertaken for short periods at a time each year and thus cumulative effects are not significant due to the temporary nature of the works. For the Southsea Scheme, the construction methodology is predominantly landward in nature located to the west of the Proposed Development within the vicinity of the Portsmouth Harbour navigation channel and use of marine vessels will only be used for delivery of construction material, rock armour and beach material. Accordingly, the works will be highly localised and the construction sequence for the Southsea Scheme currently shows that the closest works to the Proposed Development will be undertaken during 2023 and 2024 when Landfall works for the Proposed Development will already be completed. Therefore, the cumulative effects are not considered significant and effects of these projects are ranked as **tolerable** (**moderate risk**)		

ID	Tier	Project Name	Assessment of cumulative effect	Proposed mitigation	Residual cumulative effect
Nos 60-63, 73-78, 80, 82, 83 & 87	1	Various dredge/disposal projects*	There are multiple dredging projects licensed for various marinas with time periods overlapping the installation of the marine cabling. Therefore, there may be a slight increase in disruption to vessel activities and/or routeing and a small increase in collision risk if project works were carried out simultaneously. However, due to the small scale and temporary nature of these projects, there is not expected to be any significant cumulative effects. The cumulative effects arising from these overlapping dredging works are ranked as **tolerable** (**moderate risk**).	None	**Not significant**
113	1	Archaeological investigation of Hazardous Prize wreck site	Exact timelines for this work are not available; however, the licence is valid until 2046. Archaeological works and any movement of vessels to and from the wreck could lead to the potential for cumulative impacts associated with disruption to fishing and recreational activities. As the wreck is located in shallow waters, and therefore fishing and recreational activities in this area are expected to be minimal, the cumulative effect is anticipated to be **broadly acceptable (low risk)**.	None	**Not significant**

Table 29.14 – Summary of significant cumulative effect assessment matrix – Onshore

ID	Tier	Project Name and Reference	Topic	Assessment of cumulative effect with NSIP	Proposed mitigation applicable to NSIP including any apportionment	Residual cumulative effect
Construction (and decommissioning)						
67	Tier	Land South of Lovedean Electricity Substation, Broadway Lane, Lovedean, Waterlooville 57524/001	Landscape and Visual Amenity	Section 1 Converter Station: Proposal for 40 energy storage batteries, 132 kv substation to a height of 5.5 m, two customer substations up to 2.5 m surrounded by a 2.1 m high fence with a new access point off Broadway Lane and mitigation planting. Landscape Character: Localised **moderate adverse (significant)** cumulative effects on landscape character LCA3fi during construction. Localised **moderate adverse (significant)** cumulative effects on land use and infrastructure through the	Embedded mitigation: Implementation of the Outline Landscape and Biodiversity Strategy (document reference 6.10), the Onshore Outline Construction Environmental Management Plan (CEMP – document reference 6.9) and mitigation planting proposed along northern edge of PRoW, DC16/HC04 and Access Road. Proposed mitigation: This development is currently not permitted.	Landscape character: Localised **moderate adverse (significant)** cumulative effects on landscape character LCA3f during construction. Localised **moderate adverse (significant)** cumulative effects on land use and infrastructure through the creation of a further access point during construction and at year 0, operation. Localised **moderate adverse (significant)**

ID	Tier	Project Name and Reference	Topic	Assessment of cumulative effect with NSIP	Proposed mitigation applicable to NSIP including any apportionment	Residual cumulative effect
				creation of a further access point during construction and at year 0, operation. Localised **moderate adverse (significant**) cumulative effects on tranquillity during construction.	However, if sites are ultimately constructed concurrently then site liaison and management would be required where practicable, to reduce effects, in relation to impacts on landscape, visual amenity, construction traffic management and noisy activities.	cumulative effects on tranquillity during construction. Visual amenity: **Moderate adverse (significant)** cumulative effects on immediate residents and recreational users of PRoW DC16/HC04 and minor adverse (not significant) on users of PRoW DC19/HC28.
68	n/a	Land to the south of Old Mill Lane and east/south-east of The Haven, Denmead 19/01071/FUL	Landscape and Visual Amenity	Section 1 Converter Station: Access off Old Mill Lane utilising an existing field gate, 4 m high acoustic fence along the western boundary and 20 contained battery units with associated infrastructure edged by 2.75	Embedded mitigation: Implementation of the Outline Landscape and Biodiversity Strategy, Onshore Outline CEMP and mitigation planting proposed measures for	Landscape character: Localised **moderate adverse (significant)** cumulative effects on landscape character Downland Mosaic, LCTW2 and setting of

ID	Tier	Project Name and Reference	Topic	Assessment of cumulative effect with NSIP	Proposed mitigation applicable to NSIP including any apportionment	Residual cumulative effect
				m high palisade fencing, CCTV cameras and landscaping. Landscape character: Localised **moderate adverse (significant)** cumulative effects on landscape character Downland Mosaic, LCTW2 and setting of SNDP during construction. Localised **moderate adverse (significant)** cumulative effects on land use and infrastructure through the creation of a further access track during construction and at year 0, operation. Localised **moderate adverse (significant)** cumulative effects on tranquillity during construction through the	the Converter Station in terms of planting. Proposed mitigation: This development is currently not permitted. However, if sites are ultimately constructed concurrently then site liaison and management would be required where practicable, to reduce effects, in relation to impacts on landscape, visual amenity, construction traffic management and noisy activities. Additional mitigation planting measures to the west and north of Development No.68 to provide further	SNDP during construction. Localised **moderate adverse (significant)** cumulative effects on land use and infrastructure through the creation of a further access track during construction and at year 0, operation. Localised **moderate adverse (significant)** cumulative effects on tranquillity during construction through the movement of construction traffic along Old Mill Lane. Visual Amenity:

ID	Tier	Project Name and Reference	Topic	Assessment of cumulative effect with NSIP	Proposed mitigation applicable to NSIP including any apportionment	Residual cumulative effect
				movement of construction traffic along Old Mill Lane. Visual Amenity: **Moderate adverse (significant)** cumulative effects on immediate residents and recreational users of Monarch's Way.	screening for immediate residents and Monarch's Way as well as introduction of hedgerow trees within existing hedgerow to the east of Development No. 68.	**Moderate adverse (significant)** cumulative effects on immediate residents and recreational users of Monarch's Way.
			Onshore Ecology	The development is sited on calcareous semi-improved grassland habitat which would be lost upon construction to the battery storage plant footprint. This would act in-combination with loss of semi-improved calcareous grassland attributed to the Converter Station Area of the Proposed Development. This would result in a **moderate adverse (significant)** effect.	Creation of new calcareous grassland habitat within the Proposed Development's landscape mitigation proposals will offset losses. However, there is not the opportunity to replace the same amount of habitat as is to be lost to both the Proposed Development	Residual loss of calcareous semi-improved grassland habitat. The effect on this feature would remain **moderate** and **significant** however as together the proposals would only lead to partial loss of semi-improved calcareous grassland.

ID	Tier	Project Name and Reference	Topic	Assessment of cumulative effect with NSIP	Proposed mitigation applicable to NSIP including any apportionment	Residual cumulative effect
					and the battery storage plant.	
74		Southsea Seafront from Long Curtain Moat in the West to Eastney Marine Barracks in the East (19/01097/FUL)	Waste and Material Resources	Construction material types may require similar materials, specifically in relation to rock armouring of the quay wall and marine cable route of the Proposed Development. At this time, the availability of information on the source of rock armour materials required for the flood and coastal erosion management scheme is not sufficient to permit an assessment of cumulative impacts. Operational material resource consumption from the Proposed Development is minimal with the exception of	Mitigation for the Proposed Development has been identified in the Chapter 27, however based on a worst case scenario, the post mitigation residual effect remains significant due to the specialist nature of the rock required for the Marine Cable Corridor. Until data on the source of rock armour materials required for the Flood and coastal erosion management scheme, further mitigation cannot be proposed.	The post mitigation residual effect remains as **adverse significant**.

ID	Tier	Project Name and Reference	Topic	Assessment of cumulative effect with NSIP	Proposed mitigation applicable to NSIP including any apportionment	Residual cumulative effect
				specialist rock material. At this time, the availability of information on the source of rock armour materials required for the flood and coastal erosion management scheme is not sufficient to permit an assessment of cumulative impacts. At present the potential effect is deemed to be **adverse significant.**		
Operation						
67	Tier	Land South of Lovedean Electricity Substation, Broadway Lane, Lovedean, Waterlooville 57524/001	Landscape and Visual Amenity	Section 1 Converter Station: Proposal for 40 energy storage batteries, 132 kv substation to a height of 5.5 m, two customer substations up to 2.5 m surrounded by a 2.1 m high fence with a new	Implementation of the Outline Landscape and Biodiversity Strategy, the Onshore Outline CEMP and mitigation planting proposed along northern edge of PRoW. DC16/HC04 and Access Road.	Landscape Character: Localised **moderate adverse (significant**) cumulative effects on land use and infrastructure through the creation of a

ID	Tier	Project Name and Reference	Topic	Assessment of cumulative effect with NSIP	Proposed mitigation applicable to NSIP including any apportionment	Residual cumulative effect
				access point off Broadway Lane and mitigation planting. Landscape Character: Localised **moderate adverse (significant)** cumulative effects on land use and infrastructure through the creation of a further access point at year 0, operation. Visual Amenity: **Moderate adverse (significant)** cumulative effects on immediate residents and recreational users of PRoW DC16/HC04 and minor adverse (not significant) on users of PRoW DC19/HC28.		further access point at year 0, operation. Visual amenity: **Moderate adverse (significant)** cumulative effects on immediate residents and recreational users of PRoW DC16/HC04 and minor adverse (not significant) on users of PRoW DC19/HC28. After 10 years (post year 0 operation) visual impacts would reduce as embedded mitigation planting matures and effects would vary from minor-moderate to negligible)

ID	Tier	Project Name and Reference	Topic	Assessment of cumulative effect with NSIP	Proposed mitigation applicable to NSIP including any apportionment	Residual cumulative effect
68	n/a	Land to the south of Old Mill Lane and east/south-east of The Haven, Denmead 19/01071/FUL	Landscape and Visual Amenity	Section 1 Converter Station: Access off Old Mill Lane utilising an existing field gate, 4 m high acoustic fence along the western boundary and 20 contained battery units with associated infrastructure edged by 2.75 m high palisade fencing, CCTV cameras and landscaping. Landscape character: Localised **moderate adverse (significant)** cumulative effects on land use and infrastructure through the creation of a further access track at year 0, operation. Visual amenity: **Moderate adverse (significant)** cumulative	Implementation of the Outline Landscape and Biodiversity Strategy, Onshore Outline CEMP and mitigation planting proposed measures for the Converter Station in terms of planting. Additional mitigation planting measures to the west and north of Development No.68 to provide further screening for immediate residents and Monarch's Way as well as introduction of hedgerow trees within existing hedgerow to the east of Development No. 68.	Landscape character: Localised **moderate adverse (significant)** cumulative effects on land use and infrastructure through the creation of a further access track at year 0, operation. Visual amenity: **Moderate adverse (significant)** cumulative effects on immediate residents and recreational users of Monarch's Way. After 10 years (post year 0 operation) visual impacts would reduce as embedded mitigation planting matures and effects

ID	Tier	Project Name and Reference	Topic	Assessment of cumulative effect with NSIP	Proposed mitigation applicable to NSIP including any apportionment	Residual cumulative effect
				effects on immediate residents and recreational users of Monarch's Way.		would vary from minor-moderate to negligible).

29.6. ASSESSMENT OF INTRA-PROJECT EFFECTS

29.6.1. POLICY AND REGULATIONS

29.6.1.1. Legislation and guidance relevant to the assessment of intra-project effects is summarised in section 29.2 above. There is no prescribed guidance on how the interrelationships of effects of different elements of the Proposed Development (intra-project effects) should be assessed however, the definitions given in EN-1 (the relevant NPS for the Proposed Development) and Regulation 5 of the EIA Regulations have been considered.

EN-1:

"The IPC [now the Inspectorate] 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."

EIA Regulations (Regulation 5 (2)):

(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 Directive 92/43/EEC(a) 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).

29.6.2. ASSESSMENT

Overview

29.6.2.1. This section assesses the potential intra-project effects on a range of marine and onshore receptors occurring as a result of interrelationships between different impacts arising from the construction, operation and maintenance and decommissioning Stages of the Proposed Development.

29.6.2.2. This section draws on information within the individual ES chapters (Chapter 6 to 28) and considers the potential for intra-project effects to arise from the Proposed Development.

Study Area

29.6.2.3. Intra-project effects may occur wherever two or more effects arising from the construction, operation and maintenance and decommissioning of the Proposed

Development have an impact on a specific receptor. The study area for combined effects is therefore considered to be the maximum extent to which two (or more) effects may cause an impact on a single receptor. In this case, the spatial extent of all effects assessed within each topic chapter in this ES defines the study area.

Method of Identifying Interrelationships

29.6.2.4. Consideration of interrelated impacts has been undertaken on all impacts identified for marine receptors. Although an effect resulting from an impact may be assessed as not significant in isolation, when it is considered in an interrelated manner with other impacts on the same receptor, it may be considered to give rise to significant effects. Consideration of interrelated impacts has been undertaken on all significant impacts identified for onshore receptors.

29.6.2.5. Receptors, and the potential impacts upon them have been identified and assessed in the individual technical chapters. The majority of these impacts considered are direct impacts but indirect impacts are also considered. For example, increased levels of SSC in the water column due to construction works could reduce the ability of marine birds to locate fish.

29.6.2.6. However, there is also the potential for interrelationships between two or more impacts to result in a larger effect on an individual receptor or group of receptors. For example, in the marine sections increased levels of SSC in the water column due to construction works could alter fish distribution patterns which could also reduce the ability of marine birds to locate fish, thereby reducing the overall foraging success of marine birds.

29.6.2.7. An example for the onshore elements includes the temporary loss of recreational areas during construction, from disruption from changes to access, traffic, noise, air and visual amenity and changes to landscape have the potential to negatively affect recreation, open space and their users. This could have negative implications on human health, socioeconomics and landscape and visual amenity.

29.6.2.8. In addition, different interactions of impacts may result in an additive or synergistic effect. Additive effects are those where similar types of impact from the Proposed Development may affect a receptor at the same time in a similar way. Whilst synergistic effects are those where different types of impact affect a receptor and interact to increase their combined significance. For example, increased SSC may alter fish distributions, reduce the abundance of benthic organisms, and lower the visual acuity of foraging marine birds, all leading to reduced foraging success for marine birds. For example, a worsening of air quality, increased noise and severance at a community facility could have negative implications for human health and socio-economics.

29.6.2.9. To identify where interrelationships (or intra-project effects) might occur, a comparison of all technical chapters was undertaken and is presented in Table 29.15 (Marine) and Table 29.16 (Onshore) below. The receptors assessed within each technical chapter are not the subject of identified interrelationships. It is the interrelated impacts associated with other receptors during the construction, operation (including repair and maintenance) and decommissioning that has been considered.

29.6.2.10. Further consideration of the marine intra-project effects is then presented in Appendix 29.3 (Marine Intra-Project Effects) Tables 1.2 to 1.9 and a summary of this is provided in Table 29.17 below.

29.6.2.11. Table 29.17 and Appendix 29.3 (Marine Intra-Project Effects) reveal that, the interrelationship of effects to marine receptors are not considered to result in additive or synergistic effects that would alter the conclusions of the assessments presented in marine ES chapters (Chapters 6 – 14).

29.6.2.12. In summary, the interrelationship of effects to onshore receptors are not considered to result in an additive or synergistic effect that would alter the conclusions made in the environmental topic chapter assessments.

Table 29.15 - Interrelationships between marine receptors assessed in Chapters 6 to 14

Interrelationships between technical chapters	Physical Processes	Marine Water and Sediment Quality	Intertidal and Benthic Habitats	Fish and Shellfish	Marine Mammals	Marine Ornithology	Commercial Fisheries	Shipping, Navigation and Other Marine Users	Marine Archaeology
Physical Processes		✓	✓	✓	✓	✓	✓	✓	✓
Marine Water and Sediment Quality	✓		✓	✓	✓	✓	✓		
Intertidal and Benthic Habitats	✓	✓		✓	✓	✓	✓		
Fish and Shellfish	✓	✓	✓		✓	✓	✓	✓	
Marine Mammals	✓	✓	✓	✓			✓		
Marine Ornithology	✓	✓	✓	✓			✓		
Commercial Fisheries	✓	✓	✓	✓	✓	✓		✓	
Shipping, Navigation and Other Marine Users	✓			✓			✓		
Marine Archaeology	✓								

Table 29.16 - Interrelationships between onshore receptors assessed in Chapters 15-26

Interrelationship between technical chapters	Landscape & Visual Amenity	Onshore Ecology	Soils & Agricultural Land use	Ground Conditions	Groundwater	Surface Water Resources & Flood Risk	Heritage & Archaeology	Traffic & Transport	Air Quality	Noise & Vibration	Socio-economics	Human Health	Waste & Material Resources	Carbon & Climate Change
Landscape & Visual Amenity		✓	✓					✓		✓	✓	✓		
Onshore Ecology	✓													
Soils & Agricultural Land Use														
Ground Conditions					✓	✓						✓		
Groundwater				✓		✓								
Surface Water Resources & Flood Risk				✓	✓						✓	✓		
Heritage & Archaeology														
Traffic & Transport	✓										✓			
Air Quality											✓	✓		
Noise & Vibration		✓									✓	✓		
Socio-economics	✓					✓		✓	✓	✓		✓		
Human Health	✓					✓			✓	✓	✓			✓

Interrelationship between technical chapters	Landscape & Visual Amenity	Onshore Ecology	Soils & Agricultural Land use	Ground Conditions	Groundwater	Surface Water Resources & Flood Risk	Heritage & Archaeology	Traffic & Transport	Air Quality	Noise & Vibration	Socio-economics	Human Health	Waste & Material Resources	Carbon & Climate Change
Waste & Material Resources														
Carbon & Climate Change												✓		

Table 29.17 – Summary of assessment of Marine Intra-Project Effects for all stages of the Proposed Development

Receptor	Topics	Combined/Intra-project Effects
Marine water and sediment quality	Physical Processes	Increased suspended sediment concentrations ('SSC')/resuspension of contaminated sediments from dredging and cable installation may negatively impact water quality. These effects have been assessed in Chapter 7 (Marine Water and Sediment Quality) and are considered to be **not significant**.
Benthic habitats, flora and fauna	Physical Processes / Marine Water and Sediment Quality	Increased SSC may have direct impacts on benthic habitats and organisms i.e. smothering and indirect effects from damage to feeding of benthic organisms. The resuspension of contaminated sediments may lead to direct toxic impacts on benthic organisms. These effects have been assessed within Chapter 8 (Intertidal and Benthic Habitats) and are considered to be **not significant**. In addition, changes to hydrodynamic regimes may alter feeding success and distribution of benthic habitats and organisms. Changes to the hydrodynamic regime are not predicted to be significant within Chapter 6 (Physical Processes) and therefore no significant additive or synergistic effects are predicted.
	Fish and Shellfish / Marine Mammals and Basking Sharks / Marine Ornithology	Fish, marine mammals and marine birds may be displaced during construction, maintenance and decommissioning works, resulting on increased predation pressure on benthic organisms outside of the Proposed Development.

Receptor	Topics	Combined/Intra-project Effects
		Effects from these impacts are considered to be temporary and short term, the area potential predators would be displaced into is much larger than that of the Proposed Development so displaced predation activities would be well diluted. Accordingly, no significant additive or synergistic effects are predicted.
	Commercial Fisheries	Displaced fishing vessels due to temporary loss or restricted access to fishing grounds during works could result in increased fishing pressures and damage to benthic communities in areas outside of the Proposed Development. The areas impacted by the works represent a relatively small proportion of available fishing grounds in the wider area and impacts will be temporary. Accordingly, no significant additive or synergistic effects are predicted.
Fish and Shellfish	Physical Processes	Suspended sediments may have direct impacts on shellfish (smothering), and indirect effects could reduce the availability of feeding and spawning habitats for fish and shellfish. These effects have been assessed within Chapter 9 (Fish and Shellfish) and are considered to be **not significant**. Changes in the hydrodynamic regime (including scour) could change the composition of benthic communities there by reducing the availability of feeding opportunities for fish and shellfish. However, Chapter 6 (Physical Processes) concludes that any changes to wave and tidal patterns will be negligible therefore, no significant additive or synergistic effects are predicted.

Receptor	Topics	Combined/Intra-project Effects
	Marine Water and Sediment Quality	The resuspension of contaminated sediments or the release of chemicals in the marine environment from a pollution incident may cause direct toxic effects on fish and shellfish. The contaminated sediment survey did not identify high levels of contaminants in the area of the Proposed Development. In addition, best practice measures will be in place to minimise the risk of pollution incidents. Accordingly, no significant additive or synergistic effects are predicted.
	Intertidal and Benthic Habitats	Loss / disturbance of benthic habitats and organisms, through direct impacts and impacts such as smothering, may reduce availability food availability for fish and shellfish. These effects have been assessed within Chapter 9 (Fish and Shellfish) and are considered to be **not significant**.
	Marine Mammals and Basking Sharks / Marine Ornithology	Marine mammals and marine birds may be displaced during construction, maintenance and decommissioning works, resulting on increased predation pressure on fish and shellfish outside of the Proposed Development. Effects from these impacts are considered to be temporary and short term, the area potential predators would be displaced into is much larger than that of the Proposed Development so displaced predation activities would be well diluted. Accordingly, no significant additive or synergistic effects are predicted.

Receptor	Topics	Combined/Intra-project Effects
	Commercial Fisheries	Displaced fishing vessels due to temporary loss or restricted access to fishing grounds during works could result in increased fishing pressures in areas outside of the Proposed Development. The areas impacted by the works represent a relatively small proportion of available fishing grounds in the wider area and impacts will be temporary. Accordingly, no significant additive or synergistic effects are predicted.
Marine mammals	Physical Processes	Suspended sediments may have direct impacts on shellfish (smothering), and indirect effects could reduce the availability of feeding and spawning habitats for fish and shellfish, thereby reducing prey availability for marine mammals. Changes in the hydrodynamic regime (including scour) may change the composition of benthic communities there by reducing the availability of feeding opportunities for fish and shellfish and as a result, marine mammals. No significant additive or synergistic effects are predicted.
	Marine Water and Sediment Quality	The resuspension of contaminated sediments or the release of chemicals in the marine environment from a pollution incident may cause direct toxic effects on marine mammals, and/or their prey. The contaminated sediment survey did not identify high levels of contaminants in the area of the Proposed Development. In addition, best practice measures will be in place to minimise the risk of pollution incidents. Accordingly, no significant additive or synergistic effects are predicted.

Receptor	Topics	Combined/Intra-project Effects
	Intertidal and Benthic Habitats / Fish and Shellfish	Loss and/or disturbance of benthic habitats and organisms may reduce the availability of benthic organisms which marine mammals or their prey (including fish and shellfish) may feed. Habitat loss/disturbance will be localised to areas within the Proposed Development and these areas represent relatively small proportions of available habitat in the wider area. No significant additive or synergistic effects are predicted.
	Fish and Shellfish	Fish could be displaced from the Proposed Development due to noise and vibration, thereby reducing the prey available to marine mammals. Effects to fish from noise as a result of the works are considered to be of low intensity and short duration. Accordingly, no significant additive or synergistic effects are predicted.
	Commercial Fisheries	Displaced fishing vessels due to temporary loss or restricted access to fishing grounds during works could result in increased fishing pressures areas outside of the Proposed Development, potentially reducing prey availability for marine mammals. The areas impacted by the works represent a relatively small proportion of available fishing grounds in the wider area and impacts will be temporary and well diluted. Accordingly, no significant additive or synergistic effects are predicted.
Marine birds	Physical Processes	Suspended sediments may have direct impacts on shellfish (smothering), and indirect effects could reduce the availability of feeding and spawning

Receptor	Topics	Combined/Intra-project Effects
		habitats for fish and shellfish, thereby reducing prey availability for marine birds. Changes in the hydrodynamic regime (including scour) may change the composition of benthic communities there by reducing the availability of feeding opportunities for fish and shellfish and as a result, marine birds. No significant additive or synergistic effects are predicted.
	Marine Water and Sediment Quality	The resuspension of contaminated sediments or the release of chemicals in the marine environment from a pollution incident may cause direct toxic effects on marine birds, and/or their prey. The contaminated sediment survey did not identify high levels of contaminants in the area of the Proposed Development. In addition, best practice measures will be in place to minimise the risk of pollution incidents. Accordingly, no significant additive or synergistic effects are predicted.
	Intertidal and Benthic Habitats / Fish and Shellfish	Loss and/or disturbance of benthic habitats and organisms may reduce the availability of benthic organisms which marine birds or their prey (including fish and shellfish) may feed. Habitat loss/disturbance will be localised to areas within the Proposed Development and these areas represent relatively small proportions of available habitat in the wider area. Chapter 11 (Marine Ornithology) assesses the potential loss of prey availability from habitat loss/disturbance and concludes that any effects are **not significant.**

Receptor	Topics	Combined/Intra-project Effects
	Fish and Shellfish	Fish could be displaced from the Proposed Development due to noise and vibration, thereby reducing the prey available to marine birds. Effects to fish from noise and vibration as a result of the works are considered to be of low intensity and short duration. Accordingly, no significant additive or synergistic effects are predicted.
	Commercial Fisheries	Displaced fishing vessels due to temporary loss or restricted access to fishing grounds during works could result in increased fishing pressures areas outside of the Proposed Development, potentially reducing prey availability for marine birds and increasing levels of disturbance to marine birds through increased vessel movements. The areas impacted by the works represent a relatively small proportion of available fishing grounds in the wider area and impacts will be temporary. Accordingly, no significant additive or synergistic effects are predicted.
Commercial fisheries	Physical Processes	Increased suspended sediments and changes in hydrodynamic regime may impact fish and shellfish through reducing their foraging habitats and prey availability. This in turn may lead to reduced catches. No significant additive or synergistic effects are predicted.
	Marine Water and Sediment Quality	The resuspension of contaminated sediments or the release of chemicals in the marine environment from a pollution incident may cause direct toxic effects on fish and shellfish, therefore reducing catches. The contaminated sediment survey did not identify high levels of contaminants in the area of the Proposed Development. In addition, best

Receptor	Topics	Combined/Intra-project Effects
		practice measures will be in place to minimise the risk of pollution incidents. Accordingly, no significant additive or synergistic effects are predicted.
	Intertidal and Benthic Habitats / Fish and Shellfish	Loss and/or disturbance of benthic habitats and organisms may reduce the availability of benthic organisms which marine birds or their prey (including fish and shellfish) may feed. This may result in reduced catches. Habitat loss/disturbance will be localised to areas within the Proposed Development and these areas represent relatively small proportions of available habitat in the wider area. Accordingly, no significant additive or synergistic effects are predicted.
	Fish and Shellfish	Fish could be displaced from the Proposed Development due to noise and vibration, thereby potentially reducing catch availability. Effects to fish from noise as a result of the works are considered to be of low intensity and short duration. Accordingly, no significant additive or synergistic effects are predicted.
	Shipping, Navigation and Other Marine Users	Due to increased vessel traffic during cable installation and repair and maintenance activities, there may be increased collision risk, navigational safety and disruption of fishing activities. Best practice measures will be in place to communicate with other marine users to minimise risks to navigational safety. No significant additive or synergistic effects are predicted.
Recreational anglers / vessels	Physical Processes	Increased SSC and sediment deposition may impact fish and shellfish species in the area, potentially reducing catch for recreational anglers. In

Receptor	Topics	Combined/Intra-project Effects
		addition, sediment deposition may have a direct impact on under keel clearance of vessels in shallow waters. Effects from increased SSC on fish and shellfish have been assessed in Chapter 9 (Fish and Shellfish) and are considered to be **not significant**. As described in Chapter 13, as part of the embedded mitigation, the works will not result in a reduction of navigable depth of more than 5%. Accordingly, no significant additive or synergistic effects are predicted.
Recreational anglers	Fish and Shellfish	Habitat loss or disturbance for fish and shellfish species in the area may reduce availability of catch for anglers. Any habitat loss will be confined to localised areas of the Proposed Development which represents a relatively small proportion of the wider alternative habitat available in the area. Accordingly, no significant additive or synergistic effects are predicted.
	Fish and Shellfish	Fish could be displaced from the area of the Proposed Development due to noise and vibration leading to reduced abundance in the area and potentially reduced catch. Noise will be confined to localised areas of the Proposed Development and will be of low intensity and short duration. Accordingly, no significant additive or synergistic effects are predicted.
Marine archaeology	Physical Processes	Alterations to the hydrodynamic regime may increase exposure of archaeological assets causing erosion/deterioration.

Receptor	Topics	Combined/Intra-project Effects
		In addition, increased SSC may lead to risk of smothering of archaeological features in the area of the Proposed Development. These effects are assessed within Chapter 14 (Marine Archaeology) and are considered to be **not significant.**

Table 29.18 - Assessment of Onshore Intra-Project Effects

Receptor	Chapter	Stage	Section	Combined/Intra-project Effects
Community Facilities	Human Health, Socio-economics	Construction	Sections 2 - 10	Disruption from changes to access, traffic, noise, air and visual amenity have potential to negatively affect community facilities during construction. Disruption of these community facilities could result in negative implications for human health, through loss of social contact, difficulty reaching essential services and the subsequent stress and anxiety this may cause. Despite this, given that the effect is temporary, and the effects identified are of a minor significance, the intra-relationship of effects on community facilities would not result in additive or synergistic effects and are therefore **not significant.**
Recreation, Open Space and Users	Socio-Economics, Human Health, Landscape &	Construction	Section 1 - Converter Station	During construction the temporary loss of recreational areas, disruption from changes to access, traffic, noise, air and visual amenity and changes to landscape have the potential to negatively affect recreation, open space and their users. Disruption of recreational and open spaces has potential to

Receptor	Chapter	Stage	Section	Combined/Intra-project Effects
	Visual Amenity			result in negative implications on health as resident's activities may become hindered by construction. Despite this, given that the effect is temporary, and the effects identified are of a minor significance, the intra-relationship of effects on recreation and open space users would not result in additive or synergistic effects and are therefore **not significant.**
Residents	Noise & Vibration, Socio-economics, Air Quality	Construction	Section 1 - Converter Station	During construction residents residing within the vicinity of the Converter Station have the potential to be negatively impacted by noise emissions, disruption from changes to access and traffic and changes to the landscape and the consequential reduced perceived amenity value. Despite this, given that the effect is temporary, and the effects identified are of a minor significance, the intra-relationship of effects on residents would not result in additive or synergistic effects and are therefore **not significant.**
Residents	Noise & Vibration, Air Quality	Operation	Section 1 - Converter Station	During operation residents residing within the vicinity of the Converter Station have the potential to be negatively impacted by noise emissions changes to the landscape and consequential reduced perceived amenity value and the perceived fear of harm from Electromagnetic Fields ('EMF') exposure The intra-relationship of effects on residents would not result in additive or synergistic effects that would alter the significance.

Receptor	Chapter	Stage	Section	Combined/Intra-project Effects
				Despite this, given that the effects identified are of a minor significance, the intra-relationship of effects on the health of residents would not result in additive or synergistic effects and are therefore **not significant.**
Health of residents	Ground Conditions, Human Health, Noise & Vibration, Landscape and Visual Amenity, Air Quality	Construction	All sections	The health of residents living along the Proposed Development has the potential to be negatively affected during construction. Annoyance caused by noise, traffic, changes in landscape, changes in the local business activity and disruptions to local transport and access to community facilities and residence, could result in adverse effects on health (which may include anxiety, psychological effects and sleep disturbance) and therefore causing lower levels of quality of life and wellbeing during construction. Exposure to contaminated soils and groundwater during removal of contaminated soils and reduced air quality during construction could also have negative implications on health. Indirect impacts associated with changes in the local business activity and employment resulting in beneficial health outcomes such as improved mental health and physical health and provided opportunities for social contact. Despite this, given that the effect is temporary, and the effects identified are of a minor significance, the intra-relationship of

Receptor	Chapter	Stage	Section	Combined/Intra-project Effects
				effects on the health of residents would not result in additive or synergistic effects and are therefore **not significant.**
Users of Day Lane/ Broadway Lane	Landscape & Visual Amenity, Traffic & Transport	Construction	Section 1 - Converter Station	Cyclists and pedestrians along Day Lane/Broadway Lane using the Horndean Technology College route are likely to experience significant visual effects during construction. The construction of the Converter Station access junction may need to be facilitated by shuttle working traffic signals, leading to minor delays to vehicles using both Day Lane and Broadway Lane. Temporary highway amendments also have potential to negatively impact users through traffic delays and disruption from the temporary removal of street furniture and tree/hedge pruning. Despite this, given that the effect is temporary, and the effects identified are of a minor significance, the intra-relationship of effects on the health of residents would not result in additive or synergistic effects and are therefore **not significant.**
Groundwater - Potable Water	Ground Conditions, Groundwater, Surface Water Resources & Flood Risk	Construction	All sections	Potable water has the potential to be negatively affected by spills associated with construction works, exposure of contaminated soils and groundwater, removal of contaminated soils, change in demand on network/ catchment and the addition of further hardstanding. Given that the residual effects of these topics on the receptor is deemed to either be negligible or insignificant, the intra-

Receptor	Chapter	Stage	Section	Combined/Intra-project Effects
				relationship of effects would not result in additive or synergistic effects that would alter the significance.
Southsea Leisure Park	Socio-economics, Noise & Vibration, Landscape and Visual Amenity	Construction	Section 10 – Eastney (Landfall)	Disruption from changes to access, traffic, noise, air and visual amenity have potential to negatively affect Southsea Leisure Park during the construction of the landfall site. This has potential to cause a negative visitor experience which could have knock on effects on the business. Despite this, given that the effects identified are of a negligible or minor significance, when combined, the intra-relationship of effects on Southsea Leisure Park would not result in additive or synergistic effects and are therefore **not significant.**
Milton Common	Socio-economics Onshore Ecology	Construction	Section 8	Portions of Milton Common have the potential to be temporarily loss during construction. Access to construction areas is expected to be restricted for a period of 23 weeks (not continuous). As a temporary loss in amenity is predicted, there's potential for decreases in visitor numbers as well as the potential loss of SINC habitats. Despite this, given that the effects identified are of a negligible or minor significance, when combined, the intra-relationship of effects on Southsea Leisure Park would not result in additive or synergistic effects and are therefore **not significant.**

Receptor	Chapter	Stage	Section	Combined/Intra-project Effects
Construction Workers	Ground Conditions, Surface Water Resources & Flood Risk	Construction	All sections	During construction, construction workers have the potential to be exposed to potentially contaminated soil or groundwater as well as the risks of flooding. Climate change poses additional risks to construction workers, through health and safety risk from heatstroke, increased fire risk increased dust and UV radiation from drought extreme temperature events. Conversely, extreme colder and wetter weather poses a risk to cranes and those working at height, as well as risks from sea level rise storm surge and storm tides. Given that the residual effect of these topics on the receptor is deemed to either be negligible or minor, the intra-relationship of effects would not result in additive or synergistic and are therefore **not significant.**
Maintenance Workers	Groundwater Surface Water & Flood Risk	Operation & Decommissioning	All Sections	During operation and decommissioning, maintenance workers have the potential to be exposed to potentially contaminated soil or groundwater as well as the risks of flooding. Given that the residual effects of both topics on the receptor is deemed to be negligible or minor the intra-relationship of effects would not result in additive or synergistic effects and are therefore **not significant.**

29.7. ASSESSMENT OF TRANSBOUNDARY EFFECTS

29.7.1.1. The marine chapters (chapters 6-14) have assessed the potential likely significant transboundary effects arising from the Proposed Development within each topic chapter. Transboundary effects have not been identified for the onshore chapters (chapters 15-26) as the effects of the Proposed Development for onshore topics are not transboundary in nature, nor have they been identified in relation to Waste and Material Resources and Carbon and Climate Change impacts, which relate to both onshore and marine topics.

29.7.1.2. Transboundary effects within each chapter have been assessed through identification of particular impacts that could cause transboundary effects (e.g. increases in suspended sediments) using the same methodology undertaken for the EIA. Transboundary effects have also been considered through the inclusion of projects from other Member States (namely, France) in the cumulative assessment (e.g. see Figure 29.2).

29.7.1.3. Chapter 12 (Commercial Fisheries) also assesses potential impacts on not only the UK fishing vessels and fleets but also those from France, Belgium and Netherlands.

29.7.1.4. The impact assessments undertaken within Chapters 6-14 have not identified any significant transboundary effects resulting from the Proposed development.

29.7.1.5. The Department of Energy and Climate Change ('DECC'), now the Department for Business, Energy and Industrial Strategy ('BEIS'), has released guidelines[1] which specify that the Secretary of State will when considering whether to consent energy projects apply the principles of the Habitats Directive to any energy development where significant effects on Natura 2000 sites or candidate sites in other Member States are likely.

29.7.1.6. The guidelines provide that "*where a plan or project is likely to have a significant effect (either alone or in combination) on a Natura 2000 site in another Member State, applicants for consent for energy developments should obtain all relevant information as reasonably practicable, about those effects so that the Secretary of State can consider the likely impacts of their proposals on such sites when deciding whether or not to grant development consent".*

29.7.1.7. The potential environmental effects on features of French Natura 2000 sites has also been assessed within the Habitat Regulations Assessment ('HRA') Report (document reference 6.8.1). Section 4 of this report describes the initial pre-screening stage undertaken for the Proposed Development that identifies the sites and features

[1] Guidelines on the assessment of transboundary impacts of energy developments on Natura 2000 sites outside the UK. Department of Energy and Climate Change, March 2015. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/408465/transboundary_guidelines.pdf

to be assessed. The HRA reports that no Natura 2000 sites within French waters designated for Annex I habitat features sites have connectivity to the Proposed Development and were therefore not carried forward for any further assessment. Natura 2000 sites that possessed Annex II diadromous migratory fish, Annex II marine mammals or marine birds as features of were identified as having connectivity to the Proposed Development and underwent assessment for Likely Significant Effects ('LSE').

29.7.1.8. These assessments concluded that no adverse effects are predicted either alone, or in combination with other projects/plans on any features of the French designated sites assessed.

29.7.1.9. Transboundary effects have been identified within the technical marine chapters and have been summarised in Table 29.19 below.

Table 29.19 – Summary of Transboundary Effects

Topic	Summary of Transboundary Effect	Significance	Mitigation	Residual Transboundary Effect
Physical Processes	Where structures (i.e. cable protection measures) are located on the seabed close (i.e. within 500 m) to the EEZ boundary line potential transboundary effects could potentially occur.	Minor	None	**Not significant**
	Where suspended sediment plumes are generated by activities near the EEZ boundary line, sediment plumes would be transported in the direction of the prevailing flow. In areas further offshore, this is typically observed along an east – west axis, and therefore there is limited potential for plumes to be transported into French waters. It is assumed that impacts would be of a relatively low magnitude, short duration and transient in nature.	Minor	None	**Not significant**
Marine Water and Sediment Quality	There is potential for the sediment plume to extend into French waters, the potential impact and associated effects is considered to be temporary, of low magnitude and reversible as a result of flushing within the Channel.	Not significant	None	**Not significant**
Intertidal and Benthic Habitats	There is potential for any sediment plume arising to extend into French waters, transboundary impacts are not considered to have the potential to be significant due	Not significant	None	**Not significant**

Topic	Summary of Transboundary Effect	Significance	Mitigation	Residual Transboundary Effect
	to the low SSC predicted, and transient nature of this impact.			
Fish and Shellfish	Given the location, nature and scale of the Proposed Development, it is considered that potential impacts are unlikely to lead to any significant transboundary effects on fish or shellfish receptors. The fish and shellfish on the French and UK sides of the Channel are similar in composition, and as no significant effects have been identified in UK waters. it is considered that transboundary effects will be not significant	Not significant	None	**Not significant**
	There is potential for any sediment plume arising from construction and disposal activities to extend into French waters, however, the possible impact is considered to be temporary, of low magnitude and small spatial extent.	Not significant	None	**Not significant**
	Due to the nature of noise and vibration from the Proposed Development (low noise levels and small zones of potential impact) there will be negligible overlap with French waters and therefore the potential for transboundary effects is considered to be not significant.	Not significant	None	**Not significant**
Marine Mammals &	Due to the nature of the increased anthropogenic noise from the Proposed Development (likely to have small zones of potential impact), the low diversity of species and numbers of individuals likely to be present in the	Not significant	None	**Not significant**

Topic	Summary of Transboundary Effect	Significance	Mitigation	Residual Transboundary Effect
Basking Sharks	Channel, no significant effects on animals in UK waters were identified. Due to the small zones of potential impact, are therefore likely negligible overlap with French waters the potential for significant transboundary effects is considered to be negligible and not significant.			
Marine Ornithology	There is potential for any sediment plume arising from construction and disposal activities to extend into French waters, and therefore potential for indirect effects on prey. However, transboundary effects from this are not considered to have the potential to be significant.	Not significant	None	**Not significant**
Marine Archaeology	Although sediment plumes from construction activities are likely to extend in to French Waters, the effects from suspended sediment plumes and resultant deposition of sediment is not predicted to result in any significant effects on French archaeological receptors.	Not significant	None	**Not significant**

29.8. MITIGATION AND ENHANCEMENT MEASURES

29.8.1.1. With respect to potential localised significant effects regarding visual amenity and townscape character, site liaison and management of works and associated with detailed landscape proposals, would result in insignificant effects. For example, additional mitigation planting measures to provide further screening for immediate residents and Monarch's Way, as well as introduction of hedgerow trees within existing hedgerow.

29.8.1.2. The implementation of the Outline Landscape and Biodiversity Strategy and Onshore Outline CEMP will ensure that effects are reduced, in line with the mitigation proposed in the environmental topic chapters of this ES.

29.9. LIMITATIONS AND ASSUMPTIONS

29.9.1.1. Limitations encountered during individual assessments are detailed within Chapters 6 to 28.

29.9.1.2. The cumulative assessment is based on publicly available information.

29.9.1.3. For onshore chapters, the shortlist of developments was finalised in October 2019 to allow for assessment within the ES. Any planning applications, status updates or additional information published since October 2019 has not been included within the assessment.

29.9.1.4. For the marine chapters the long list of developments considered, and the subsequent CEA assessment was updated in October 2019.

29.10. CONCLUSION

29.10.1.1. When considered in isolation, the environmental effects of a single activity on a single receptor may not be significant. However, when individual effects are considered in combination with other effects (significant or not significant) in the same area, occurring at the same time, the resulting cumulative effect may be significant.

29.10.1.2. There are two types of cumulative effects which have been considered as part of the EIA process:

- Inter-project effects: Also referred to as 'cumulative effects' (PINS, 2019). The interaction and combination of environmental effects of the Proposed Development with other developments and activities affecting the same receptor; and
- Intra-project effects: Also referred to as 'interrelationships between topics' (PINS, 2019). The interaction and combination of environmental effects, and indirect effects of the Proposed Development affecting the same receptor, either within the site or in the local area.

29.10.1.3. Transboundary effects have also been considered. Transboundary effects are those effects that may impact countries other than the country, or countries, in which a project will be constructed and operated.

INTER-PROJECT EFFECTS

Marine

29.10.1.4. For the Marine Components of the Proposed Development (Chapters 6 – 14), no significant residual cumulative effects were predicted to result from the cumulative contribution of impacts from the Proposed Development with other projects during construction (and decommissioning) and operational stages (including repair and maintenance).

Onshore

Construction (and decommissioning)

29.10.1.5. For the onshore components of the Proposed Development (Chapters 15 – 26) and those Chapters which consider both onshore and marine (Chapters 27 and 28), significant residual cumulative effects were predicted to result from the cumulative contribution of impacts from the Proposed Development with other projects during construction (and decommissioning) stages for Onshore Ecology, Landscape and Visual Amenity and Waste and Material Resources. The significant cumulative effects were identified in relation to the following developments:

- Onshore Ecology:
  - 68 Land to the south of Old Mill Lane and east/south-east of The Haven (19/01071/FUL).
- Landscape and Visual Amenity:
  - 67 Land South of Lovedean Electricity Substation (57524/001); and
  - 68 Land to the south of Old Mill Lane and east/south-east of The Haven (19/01071/FUL).
- Waste and Materials:
  - 74 Southsea Seafront from Long Curtain Moat in the West to Eastney Marine Barracks in the East (19/01097/FUL) – Waste and materials.

29.10.1.6. These effects represent potential localised adverse (significant) cumulative inter-project effects during the Construction Stage of the Proposed Development.

29.10.1.7. A site liaison and management would reduce impacts on tranquillity to not significant for cumulative effects with Land to the south of Old Mill Lane.

Operation (including repair and maintenance)

29.10.1.8. For the onshore components of the Proposed Development (Chapters 15 - 26), significant effects from operation have been identified for Landscape and Visual Amenity. Significant cumulative effects have been identified in relation to the following developments:

- 67 Land South of Lovedean Electricity Substation (57524/001); and
- 68 Land to the south of Old Mill Lane and east/south-east of The Haven (19/01071/FUL).

INTRA-PROJECT EFFECTS

29.10.1.9. The assessment of intra-project effects considers the potential impact on both marine and onshore receptors occurring as a result of interrelationships between different impacts arising from the construction, operation and maintenance and decommissioning stages on the marine and onshore elements of the Proposed Development.

29.10.1.10. Different interactions of impacts may result in an additive or synergistic effect. Additive effects are those where similar types of impact from the Proposed Development may affect a receptor at the same time in a similar way, whilst synergistic effects are those where different types of impact affect a receptor and interact to increase their combined significance.

29.10.1.11. A number of intra-project effects have been identified for both marine and onshore receptors, however, the interrelationship of effects on these receptors are not considered to result in an additive or synergistic effect, that would alter the conclusions made in the environmental topic chapter assessments. Therefore, no significant intra-project effects are anticipated.

TRANSBOUNDARY EFFECTS

29.10.1.12. Chapters 6 - 14 of the ES have assessed the potential likely significant transboundary effects arising from the Proposed Development within each topic chapter. Transboundary effects have not been identified for the onshore chapters (chapters 15-28) as sensitive receptors are likely to be limited to the UK terrestrial environment, therefore French onshore receptors won't be affected.

29.10.1.13. Transboundary effects have also been assessed within each chapter through identification of particular impacts that could affect other countries (e.g. increases in suspended sediments). These impacts are also assessed through undertaking the Habitats Regulations Assessment which assesses the potential for adverse effects from the Proposed Development on designated sites and their features within France and the Channel Islands. Transboundary effects have also been considered through the inclusion of projects from other Member States (namely, France) in the cumulative assessment

29.10.1.14. Potential transboundary impacts were assessed primarily with France, but also with Belgium and Netherlands associated with commercial fisheries.

29.10.1.15. These assessments concluded that no significant transboundary effects are predicted and no significant adverse effects are predicted either alone, or in combination with other projects/plans on any features of the French designated sites assessed.

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