

# Norfolk Vanguard Offshore Wind Farm

# Chapter 33

## Onshore Cumulative Impacts

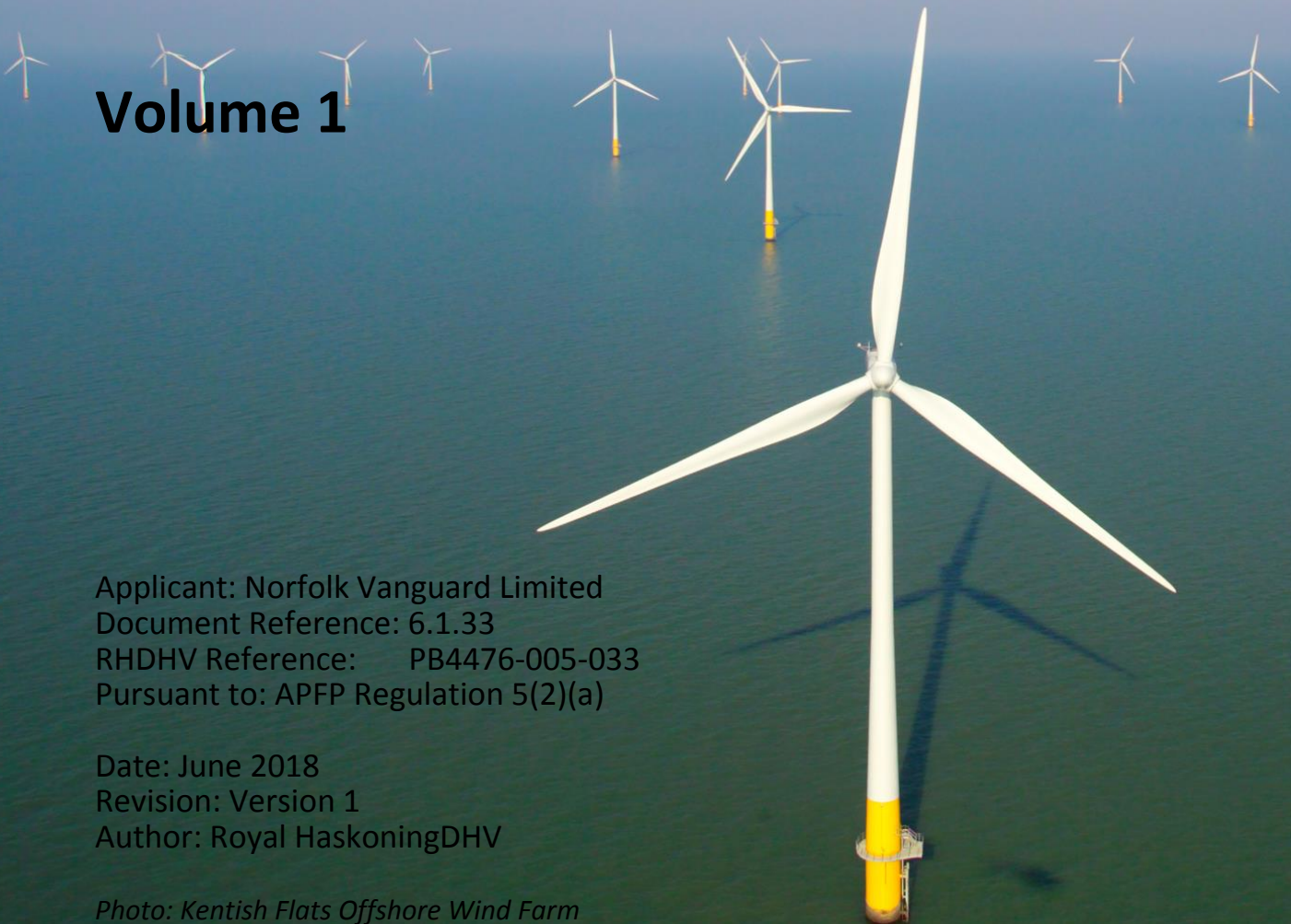
## Environmental Statement

### Volume 1

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*Photo: Kentish Flats Offshore Wind Farm*



# Environmental Impact Assessment Environmental Statement

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For and on behalf of Norfolk Vanguard Limited

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Date: 8<sup>th</sup> June 2018

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## Glossary

CIA	Cumulative Impact Assessment
DCO	Development Consent Order
EIA	Environmental Impact assessment
EMF	Electromagnetic Fields
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Groups
EU	European Union
HRA	Habitat Regulations Assessment
HVDC	High Voltage Direct Current
MOD	Ministry of Defence
MS	Member State
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NSIP	Nationally Significant Infrastructure Project
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
SAC	Special Area of Conservation
SCI	Site of Conservation Importance
SNCB	Statutory Nature Conservation Body
SNSOWF	Southern North Sea Offshore Wind Forum
SPA	Special Protection Area
ZEA	Zonal Environmental Appraisal

## Terminology

Landfall	Where the offshore cables come ashore at Happisburgh South
National Grid substation extension	The permanent footprint of the National Grid substation extension
Necton National Grid substation	The existing 400kV substation at Necton, which will be the grid connection location for Norfolk Vanguard
Onshore cable route	The 45m easement which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.
Onshore cables	The cables which take the electricity from landfall to the onshore project substation
Onshore project area	All onshore electrical infrastructure (landfall; onshore cable route, accesses, trenchless crossing technique (e.g. Horizontal Directional Drilling (HDD)) zones and mobilisation areas; onshore project substation and extension to the Necton National Grid substation and overhead line modification)
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.

Running track	The track along the onshore cable route which the construction traffic would use to access workfronts
The Applicant	Norfolk Vanguard Limited
The project	Norfolk Vanguard Offshore Wind Farm, including the onshore and offshore infrastructure
Trenchless crossing zone (e.g. HDD)	Temporary areas required for trenchless crossing works.
Workfront	The 150m length of onshore cable route within which duct installation would occur

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## 33 ONSHORE CUMULATIVE IMPACTS

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### 33.1 Introduction

1. This chapter of the Environmental Statement (ES) provides a summary of the Cumulative Impact Assessment (CIA) for the onshore topics of the proposed Norfolk Vanguard Offshore Wind Farm (herein 'the project'). Whilst each technical assessment chapter within the ES provides its own cumulative impact assessment section in relation to that topic, the purpose of this chapter is to present a more complete overview of potential onshore cumulative impacts of the project. This chapter is also provided to meet the requirement to consider transboundary impacts required by The Espoo Convention as implemented by the EIA Directive and transposed into UK law by way of the Environmental Impact Assessment (EIA) Regulations.
2. This chapter describes the requirement for CIA, and the guidance for completing CIA in relation to Nationally Significant Infrastructure Projects (NSIP), and the consultation undertaken to inform the approach that Norfolk Vanguard Limited has adopted.
3. It should be noted that an in-combination assessment has been completed as part of the Habitats Regulations Assessment (HRA) process. There are elements of the approach to CIA that are mirrored by the in-combination HRA process, in particular the method used to identify other plans, projects and activities that are taken forward in each assessment. Information to Support the HRA Report (document reference 5.3) has been submitted alongside the ES, and should be consulted for further information relevant to the assessment of effects on European Sites.
4. This chapter draws information from, and should be read in conjunction with:
  - Chapter 19 Ground Conditions and Contamination;
  - Chapter 20 Water Resource and Flood Risk;
  - Chapter 21 Land Use and agriculture;
  - Chapter 22 Onshore Ecology;
  - Chapter 23 Onshore Ornithology;
  - Chapter 24 Traffic and Transport;
  - Chapter 25 Noise and Vibration;
  - Chapter 26 Air Quality;
  - Chapter 27 Human Health;
  - Chapter 28 Onshore Archaeology and Cultural Heritage;
  - Chapter 29 Landscape and Visual Impact Assessment;
  - Chapter 30 Tourism and Recreation;

- Chapter 31 Socio-economics; and
- Information to Support the HRA Report (document reference 5.3).

### 33.2 Legislation, Guidance and Policy

5. There are numerous pieces of legislation, guidance and policy applicable to CIA, and these sections provide detail on key pieces of international and UK legislation, policy and guidance which are relevant to this chapter.

#### 33.2.1 Legislation

6. Norfolk Vanguard is subject to Environmental Impact Assessment (EIA) under European Union (EU) EIA Directive 85/337/EEC (as amended). The EIA Directive is transposed into English law for Nationally Significant Infrastructure Projects (NSIPs) by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the EIA Regulations). In 2011, the original EIA Directive and amendments were translated into EIA Directive 2011/92/EU.
7. Directive 2014/52/EU amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment was published in the European Union's Official Journal in April 2014. The requirements of Directive 2014/52/EU have been formally implemented in England insofar as relevant to NSIPs in the form of a revised set of regulations entitled 'The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017' (the EIA Regulations 2017).
8. Under Article 3(2) of the Directive, transposed by Regulation 37, the EIA Regulations 2017, where an ES is submitted or where a scoping opinion has been sought before 16 May 2017, the project can benefit from transitional provisions to continue under the provisions of the EIA Regulations 2009. However, in order to ensure the EIA is maintained at high quality and in accordance with best practice, Norfolk Vanguard Limited has given consideration to, and sought to apply, the new Directive within this ES.
9. Schedule 4 paragraph 5 of the EIA Regulations (abridged below) states the need for:

*"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 4(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.”*

10. In line with this requirement a description of likely significant cumulative effects is provided in this ES and summarised in this chapter.

### 33.2.2 Guidance

11. Guidance that is applicable to a specific assessment is identified in the relevant chapter (Chapters 19 – 31).
12. Of relevance to CIA in general, and which has been used to guide the approach taken, are the Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission 1999) and RenewableUK (2013) Cumulative impact assessment guidelines, guiding principles for cumulative impacts assessments in offshore wind farms.
13. Also of relevance to the general approach taken is Advice Note Nine, published by the Planning Inspectorate (2012). This Advice Note addresses the use of the ‘Rochdale Envelope’ approach under the Planning Act 2008 (as amended by the Localism Act 2011). Advice Note 17 also provides guidance on plans and projects that should be considered in the CIA.

#### 33.2.2.1 The Planning Inspectorate Advice Note Nine

14. The Planning Inspectorate Advice Note Nine (the Planning Inspectorate, 2012) recognises that, at the time of submitting an application, offshore wind developers may not know the precise nature and arrangement of infrastructure that make up the proposed development. This is due to a number of factors such as the evolution of technology, the need for flexibility in key commercial project decisions and the need for further detailed surveys (especially geotechnical surveys) which are required before a final design and layout can be determined. It is therefore important that a design envelope is used to provide flexibility. Where necessary, a range of parameters for each aspect of the project has been defined and subsequently, the worst case scenario associated with each parameter and dependent on the receptor has been used in each impact assessment. This provides confidence that the EIA process is robustly considering the likely impact of the project, whilst also allowing the project to be optimised and refined at the time of construction, noting that this may be several years after the DCO application is made. The project design envelope therefore provides the maximum extent of the consent sought. The detailed design of the project can then be developed, refined and procured within this consented envelope prior to construction.

15. The advice note highlights the importance of identifying and assessing the potential for cumulative impacts against the baseline position (which would include built and operational development) in order to ensure a robust application of the Rochdale Envelope.
16. In line with the advice note, this ES considers the potential for cumulative impacts to arise in the context of the flexibility being sought as part of the consent application. This chapter provides a summary of the assessment that has been undertaken.

### 33.2.3 Policy

17. CIA has been undertaken with specific reference to the relevant National Policy Statements (NPS). These are the principal decision making documents for NSIP, and those relevant to Norfolk Vanguard are:
  - Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC) 2011a);
  - NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011b); and
  - NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011c).
18. The specific requirements of the NPS in relation to CIA and the transboundary assessment, relevant to Norfolk Vanguard, are summarised in Table 33.1 and includes where in the ES they are addressed.

**Table 33.1 NPS assessment requirements for CIA**

NPS Requirement	NPS reference	ES reference
<b>EN-1 – Overarching NPS for Energy</b>		
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, section 4.2.5	This is assessed in all chapters as applicable.
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, section 4.13	Chapter 21 Human Health Chapter 30 Tourism and Recreation  Chapter 31 Socio-economics
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, section 5.7.5	Chapter 20 Water Resources and Flood Risk

NPS Requirement	NPS reference	ES reference
<b>The ES [Environmental Statement] 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.</b>	EN-1, section 5.10.5	Chapter 21 Land Use and Agriculture
<b>If development consent were to be granted for a number of projects within a region and these were developed in a similar timeframe, there could be some short-term negative effects, for example a potential shortage of construction workers to meet the needs of other industries and major projects in within the region.</b>	EN-1, paragraph 5.12.3	Chapter 20 Water Resources and Flood Risk
<b>EN-3 – NPS for Renewable Energy Infrastructure</b>		
<b>Cumulative effects of the development with other relevant proposed, consented and operational wind farms will be considered.</b>	EN-3, paragraph 2.6.169	All Chapters
<b>EN-5 – NPS for Electricity Infrastructure</b>		
<b>Cumulative landscape and visual impacts can arise where new overhead lines are required along with other related developments such as substations, wind farms and/or other new sources of power generation.</b>	EN-5, paragraph 2.8.2	Chapter 29 landscape and Visual Impact Assessment

### 33.3 Consultation

19. Consultation is an important driver of the EIA and ES, and is an ongoing process throughout the lifecycle of the project, from the initial stages through to consent and post-consent. To date, consultation regarding the approach to CIA and transboundary impact impacts has been conducted through a number of Expert Topic Groups (ETG) through an overarching Norfolk Vanguard Evidence Plan Process (EPP), the Scoping Report (Royal HaskoningDHV, 2016) and the Preliminary Environmental Information Report (PEIR) (Norfolk Vanguard Limited, 2017). Full details of the project consultation process are presented within Chapter 7 Technical Consultation. Whilst individual responses are not captured here, these are collated in the Consultation Report (document reference 5.1), which has been submitted as part of the DCO application.
20. A summary of the consultation carried out at key stages throughout the project is detailed within relevant chapter assessments and focusses on key issues defined in each assessment, consultation specifically on the CIA have been set out in Table 33.2

**Table 33.2 Consultation Responses**

Consultee	Date /Document	Comment	Response / where addressed in the ES
<b>Chapter 21 Land Use and Agriculture</b>			
Costessy Town Council	PEIR December 2017	Council has concerns that the proposed line will cross that of another recently proposed offshore wind farm: Hornsea Three, and is worried that there will be adverse effects from the crossing of two major lines which would not have occurred from a single line installation.	Potential cumulative impacts on soils and agriculture are considered in the Cumulative Impact Assessment (section 21.8 of Chapter 21 Land use and Agriculture).  Additionally, Hornsea Project Three is considered in all relevant assessments detailed in onshore chapters (19-31).
<b>Chapter 22 Onshore Ecology</b>			
Norfolk County Council	November 2017 PEIR response	The cable route runs parallel to the Marriott's Way CWS at several points and bisects it twice. Potential impacts on this site may therefore be cumulative. Cables for the DONG/Orsted 'Hornsea 3' offshore windfarm scheme also bisect the Marriott's Way in two places and so cumulative impacts may be more significant than implied, notably east of Reepham.	Consideration of cumulative effects is presented within section 22.8 of Chapter 22 Onshore Ecology
<b>Chapter 24 Traffic and Transport</b>			
Highways England (HE) and Norfolk County Council (NCC)	17 <sup>th</sup> July 2017 ETG Meeting	NCC / HE raised concerns over potential cumulative effects resultant from Norfolk Vanguard construction traffic and proposed A47 Corridor Improvement Programme schemes.	The scope of the cumulative assessment has been agreed with Highways England and NCC and is set out in section 24.8.  of Chapter 24 Traffic and Transport.
Oulton Parish Council	November 2017 PEIR Response	Consideration should be made regarding whether access to the site [MA7] is suitable, as it would require HGV's to negotiate narrow country lanes with informal passing places. Possible conflict with year round use by agricultural vehicles, residents and	All routes proposed have been subject to a detailed desktop assessment augmented by site visits to validate OS data. An outline Access Management

Consultee	Date /Document	Comment	Response / where addressed in the ES
		other vehicles plus the possibility of cumulative impact from HGV's from Dong/Orsted Hornsea 3 project also accessing another potential compound on the old airfield at Oulton Street.	Plan (AMP) (document reference 8.10) and outline Traffic Management Plan (TMP) (document reference 8.8) have been provided in support of the DCO application which contain more detail of the measures proposed to manage access via narrow routes. Norfolk Vanguard Limited are in dialogue with Norfolk Vanguard Limited is in dialogue with Ørsted with regard to coordinating traffic demand.
<b>Chapter 30 Tourism and Recreation</b>			
Necton Parish Council	November 2016 (scoping response, statutory)	A comprehensive review of the combined impact of Vanguard and Boreas on the human, environmental and social aspects of the sub-station search area. Whilst this application is considering only Vanguard, it is reasonable to consider that Boreas will be offered a connection to the same National Grid substation and the combined impact must be a consideration in this process.	Cumulative impacts (including any which may occur with Norfolk Boreas) are considered in section 30.8 of Chapter 30 Tourism and Recreation.  Additionally, Norfolk Boreas is considered in all relevant assessments detailed in onshore chapters (19-31).
<b>Chapter 31 Socio-economics</b>			
Ørsted	PEIR December 2017	Hornsea Three would welcome inclusion of socio economic impact assessment in relation to the offshore construction element in respect of national/international and local/regional socio-economic effects.  Hornsea Three would welcome consideration of: 1) the amount of Gross Value Added (GVA) supported by construction activity; 2) CIA relating to demand for housing,	Socio-economic impact assessment and Cumulative Impact Assessment have been included under sections 31.7 and 31.8 of Chapter 31 Socio-economics  GVA has not been calculated as this would require detailed information about

Consultee	Date /Document	Comment	Response / where addressed in the ES
		accommodation and local services in the Local Impact Areas	<p>employment in the offshore wind sector that is not available from official sources, such as Office of National Statistics (ONS) Furthermore, Norfolk Vanguard Limited feels that focussing on GVA would not capture the non-market services within the affected communities or the likelihood that employment opportunities would be realised.</p> <p>Norfolk Vanguard Limited has agreed through stakeholder consultation that demand for housing would be scoped out of assessment. Temporary accommodation demand is covered in Chapter 30 Tourism and Recreation. Impact on local health services is covered in Chapter 27 Human Health.</p>
Necton Parish Council	November 2016 Scoping Opinion	We would wish to understand the enduring economic legacy this development would provide to the sub-station area.	<p>The enduring economic legacy of the Necton substation area is a result of cumulative effects of multiple pieces of infrastructure. The cumulative effect is considered qualitatively in section 31.8 of Chapter 31 Socio-economics.</p> <p>Therefore, it is not possible to define the exact economic impacts of an individual element of this development.</p>



Consultee	Date /Document	Comment	Response / where addressed in the ES
			<p>However, the potential adverse impacts can be inferred by considering impact pathways such as how noisy it is in comparison to surrounding infrastructure or whether it will be visible or not. These are considered in Chapter 29 Landscape and Visual Impact Assessment and Chapter 25 Noise and Vibration.</p> <p>Norfolk Vanguard Limited will be willing to explore local interests and needs to determine how the project may be able to facilitate appropriate outcomes.</p>

### 33.4 Assessment Methodology

21. The key aim of the onshore CIA for Norfolk Vanguard is to assess whether impacts on a receptor may occur on a cumulative basis between Norfolk Vanguard and other projects, activities and plans (either consented or forthcoming) in the onshore study area.
22. The scope of the CIA (in terms of relevant issues and projects) has been established with consultees (including other developers) as the EIA has progressed, this is also detailed in Chapter 6 EIA Methodology and in each onshore technical chapter (chapters 19-32). Norfolk Vanguard Limited has taken advice and guidance from various sources to inform the CIA (sections 33.2 and 33.3). The CIA draws from findings of earlier studies undertaken to inform the East Anglia Zonal Environmental Appraisal (ZEA) (EAOW, 2012a) which considered cumulative impacts arising from the development of the whole zone and work undertaken for the EIA for East Anglia ONE (EAOW, 2012b) and East Anglia THREE (EATL, 2015).

23. The Planning Inspectorate Advice Note Nine and its complementary guidance in Advice Note 17 provide guidance on plans and projects that should be considered in the CIA based on a tiered approach with decreasing levels of likely available detail:
  - Projects that are under construction;
  - Permitted applications, not yet implemented;
  - Submitted applications not yet determined;
  - Projects on the Planning Inspectorate's Programme of Projects;
  - Development identified in relevant Development Plans, with weight being given as they move closer to adoption and recognising that much information on any relevant proposals will be limited; and
  - Sites identified in other policy documents as development reasonably likely to come forward.
24. Where it is helpful to do so, 'Tiers' of these other projects' development statuses have been defined as well as the availability of information to be used within the CIA. This approach is based on the 3 tier system proposed in Planning Inspectorate Advice Note 17. In some offshore chapters, a more refined tiering system based on the guidance issued by JNCC and Natural England in September 2013 is employed and involves 6 tiers presented below:
  - Tier 1: built and operational projects;
  - Tier 2: projects under construction plus Tier 1 projects;
  - Tier 3: projects that have been consented (but construction has not yet commenced) plus Tiers 1 and 2;
  - Tier 4: projects that have an application submitted to the appropriate regulatory body that have not yet been determined, plus Tiers 1-3;
  - Tier 5: projects that the regulatory body are expecting to be submitted for determination (e.g. projects listed under the Planning Inspectorate programme of projects), plus Tiers 1-4; and
  - Tier 6: projects that have been identified in relevant strategic plans or programmes plus Tiers 1-5.
25. The CIA is a two part process in which an initial list of projects with the potential to interact with Norfolk Vanguard is identified, based on the potential mechanism of interaction. Where it is helpful to do so, the tiered approach may be adopted, based on the availability of information for each project to enable further assessment.
26. Only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment have been included in the CIA.

27. Projects which are sufficiently implemented during the site characterisation for the project are considered as part of the baseline for the EIA.
28. Vattenfall Wind Power Ltd. (VWPL) submitted the request for a Scoping Opinion for Norfolk Boreas, the sister project to Norfolk Vanguard on 9<sup>th</sup> May 2017; therefore this project is a material consideration in the CIA for Norfolk Vanguard.
29. Onshore plans or projects to be taken into consideration include (but not limited to):
  - Other offshore wind farm infrastructure;
  - Other energy generation infrastructure;
  - Building/housing developments;
  - Installation or upgrade of roads;
  - Installation or upgrade of cables and pipelines;
  - Coastal protection works; and
  - National Grid works.
30. In line with the RenewableUK CIA Guidelines for offshore wind farms (RenewableUK, 2013), the approach to CIA attempts to incorporate an appropriate level of pragmatism. This is demonstrated in the confidence levels applied to various developments, particularly those that are known but currently lack detailed project application documentation, such as those projects at the scoping stage only. These projects have been considered for CIA only in those chapters where it is considered that the Scoping Reports contain sufficient detail with which to undertake a meaningful assessment. Where there is a lack of specific information in the public domain, such as how and when (or if) projects will be built, it is not always possible to undertake a meaningful CIA. Vattenfall Wind Power Ltd. (VWPL) submitted a request for a Scoping Opinion for Norfolk Boreas, the sister project to Norfolk Vanguard on 9<sup>th</sup> May 2017; therefore this project is considered in the CIA for Norfolk Vanguard in line with the above approach.
31. Availability of sufficient information within the public domain also arises with projects which are further developed. For example, in the case of the Hornsea Project Three, which is being promoted by Orsted, this has been included in the CIA as a Tier 5 development, following JNCC and Natural England 2013 guidance. The application for development consent was submitted in May 2018 and therefore the pre-application stage is running almost concurrently with Norfolk Vanguard. At the time of writing it has not always been the case that the data necessary for Norfolk Vanguard to undertake a meaningful CIA taking into account Hornsea Project Three (and vice versa) has been publicly available (typically that presented in the PEIR for the project). Therefore details from Hornsea Project Three's application have not been included. However, Norfolk Vanguard Ltd and Orsted are in regular dialogue

and will continue to work closely together, and with statutory consultees, to ensure the CIA is as accurate as possible. If necessary, Norfolk Vanguard Ltd will update the CIA within its Environmental Statement during examination to take into account any new data which has been made available following the submission of the Hornsea Project Three application to the Secretary of State. This approach complies with the relevant EIA Regulations and is consistent with that taken for other applications, where relevant environmental information has become available after the point of application submission.

32. The full list of plans, activities or projects to be included in the CIA has been developed as part of on-going consultation with technical consultees as part of the EPP. Some key projects were outlined and assessed within the PEIR for Norfolk Vanguard in October 2017, however subsequent to this Norfolk Vanguard Limited has further developed the list. This has been reviewed and approved by Norfolk County Council, with additional projects provided by Norfolk County Council included. The list of all plans and projects included in the onshore technical assessment's CIA can be found in Table 33.3. Appendix 33.1 lists the plans and projects which were considered but not included.

**Table 33.3 Projects and plans included in the CIA for onshore technical assessments**

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
Chapter 19 Ground Conditions and Contamination							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-Application	Expected construction 2026	0 – projects are co-located	Pre-application outline only	High	Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature on groundwater quality and resources during construction. The projects are located in the same bedrock Principal Aquifer.
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 - cable intersects project	Full PEIR available: <a href="http://hornseaproject3.co.uk/Documents-library/PEIR-Documents">http://hornseaproject3.co.uk/Documents-library/PEIR-Documents</a>	High	Yes	The onshore export cable route corridor will overlap the Norfolk Vanguard onshore corridor route around Reepham. The application is expected to be submitted to the Planning Inspectorate Q2 2018.  Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature on groundwater quality and resources during construction. The projects are located in the same bedrock Principal Aquifer.
Chapter 20 Water Resources and Flood Risk							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-Application	Expected construction date 2026	0 – projects are co-located	Pre-application outline only	High	Yes	Impacts arising from the Norfolk Boreas cable pull and onshore project substation were not considered in the WCS of this project, and are therefore considered in

<sup>1</sup> Shortest distance between the considered project and Norfolk Vanguard – unless specified otherwise.

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
						the CIA. Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction and operation.	
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 – cable intersects project	Full PEIR available: <a href="http://hornseaproject3.co.uk/Documents-library/PEIR-Documents">http://hornseaproject3.co.uk/Documents-library/PEIR-Documents</a>	High	Yes	The cable corridor for the Hornsea Project 3 Offshore Wind Farm makes landfall at Weybourne with grid connection at Norwich Main. The Hornsea Project 3 cable corridor crosses the Norfolk Vanguard onshore cable route within the Blackwater Drain water body catchment. The Hornsea Project 3 Offshore Windfarm would also cross watercourses in the River Wensum and the River Bure catchments, both of which will also be crossed by the Norfolk Vanguard project. Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction and operation.
Chapter 21 Land Use and Agriculture							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-Application	Expected construction date 2026	0 – projects are co-located	Pre-application outline only	High	Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction and operation.
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 – cable intersects project	Full PEIR available: <a href="http://hornseaproject3.co.uk/Documents-library/PEIR-Documents">http://hornseaproject3.co.uk/Documents-library/PEIR-Documents</a>	High	Yes	Overlapping proposed project boundaries at Reepham may result in impacts of a direct and / or indirect nature during construction and operation.

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
			library/PEIR-Documents				
Chapter 22 Onshore Ecology							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-Application	Expected construction 2026.	0	Pre-application outline only	High	Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction and operation
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 – cable intersects project.	Full PEIR available: <a href="http://www.dongenergy.co.uk/en/Pages/PEIR-Documents.aspx">http://www.dongenergy.co.uk/en/Pages/PEIR-Documents.aspx</a>	High	Yes	Overlapping proposed project boundaries at Salle Park may result in impacts of a direct and / or indirect nature during construction and operation
Dudgeon Offshore Wind Farm	Commissioned	Constructed	0	<a href="http://dudgeonoffshorewind.co.uk/">http://dudgeonoffshorewind.co.uk/</a>	High	Yes	Overlapping proposed project boundaries at Necton may result in impacts of a direct and / or indirect nature during operation
North Norfolk District Council							
Bacton Gas Terminal Coastal Protection	Approved	Approved 18/11/2016. Expires 18/11/2019	2.5	Approved PDS available	Medium	Yes	Coastal protection scheme may result in changes to coastal habitats at the landfill site.
Bacton and Walcott Coastal Management Scheme	Approved	Expected construction date 2018	1.0	Public information leaflets available: <a href="https://www.norfolk.gov.uk/media/3371/bacton">https://www.norfolk.gov.uk/media/3371/bacton</a>	Medium	Yes	Coastal protection scheme may result in changes to coastal habitats at the landfill site.

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
			-to-walcott-public-information-booklet-july-2017.pdf				
Chapter 23 Onshore Ornithology							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-Application	Expected construction 2026.	0	Pre-application outline only	High	Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction and operation
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 – cable intersects project.	Full PEIR available: <a href="http://www.dongenergy.co.uk/en/Pages/PEIR-Documents.aspx">http://www.dongenergy.co.uk/en/Pages/PEIR-Documents.aspx</a>	High	Yes	Overlapping proposed project boundaries at Salle Park may result in impacts of a direct and / or indirect nature during construction and operation
Dudgeon Offshore Wind Farm	Commissioned	Constructed	0	Approved PDS available	Complete/high	Yes	Overlapping proposed project boundaries at Necton may result in impacts of a direct and / or indirect nature during operation
Bacton Gas Terminal Coastal Protection	Approved	Approved 18/11/2016. Expires 18/11/2019	2.5	Approved PDS available	Medium	Yes	Coastal protection scheme may result in changes to coastal habitats at the landfill site.
Bacton and Walcott Coastal Management Scheme	Approved	Expected construction date 2018	1.0	Public information leaflets available: <a href="https://www.north-">https://www.north-</a>	Medium	Yes	Coastal protection scheme may result in changes to coastal habitats at the landfill site.



Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
				<a href="http://norfolk.gov.uk/media/3371/bacton-to-walcott-public-information-booklet-july-2017.pdf">norfolk.gov.uk/media/3371/bacton-to-walcott-public-information-booklet-july-2017.pdf</a>			
Chapter 24 Traffic and Transport							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-Application	Expected construction date 2026	0 – projects are co-located	Pre-application outline only	High	Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction.
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 – cable intersects project	Full PEIR available: <a href="http://hornseaproject3.co.uk/Documents-library/PEIR-Documents">http://hornseaproject3.co.uk/Documents-library/PEIR-Documents</a>	High	Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction.
A47/A12 Junction enhancements to the following junctions and roundabouts: Vauxhall, Gapton Hall, Harfreys, Bridge Road and James Paget	Pre-application	Starts 2019/2020 with projected finish year of 2022	26.7km	<a href="https://infrastructure.planninginspectorate.gov.uk/projects/eastern/a47-north-tuddenham-to-easton/">https://infrastructure.planninginspectorate.gov.uk/projects/eastern/a47-north-tuddenham-to-easton/</a>	Medium	Yes	Insufficient information in the public domain with regards to final scheme proposal. However, Norfolk Vanguard Limited have liaised with Highways England to establish a suitable ‘reference case’ for highway capacity assessments, therefore it is taken forward into the CIA

	Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale
Hospital.							
A47 corridor improvement programme – A47 Blofield to North Burlingham	Pre-application	Expected construction date 2021-22	25	<a href="https://infrastructure.planninginspectorate.gov.uk/projects/eastern/a47-blofield-to-north-burlingham/">https://infrastructure.planninginspectorate.gov.uk/projects/eastern/a47-blofield-to-north-burlingham/</a>	Medium	Yes	
A47 corridor improvement programme – A47 / A11 Thickthorn	Pre-application	Expected construction date 2020-21	18	<a href="https://infrastructure.planninginspectorate.gov.uk/projects/eastern/a47a11-thickthorn-junction/">https://infrastructure.planninginspectorate.gov.uk/projects/eastern/a47a11-thickthorn-junction/</a>	Medium	Yes	
<b>North Norfolk District Council</b>							
PF/17/1951 Erection of 43 dwellings and new access with associated landscaping, highways and external works	Awaiting decision	Anticipated Q2 2018	0.7	<a href="https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&amp;keyVal=_NNO RF_DCAPR_92323">https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&amp;keyVal=_NNO RF_DCAPR_92323</a>	High	Yes	Sub-regional growth in housing as adopted by the region's Local Plans has been captured within TEMPro future year growth factors for 2022. Therefore, the cumulative effect of housing projects is inherent in the traffic and transport impact assessments.
<b>Breckland Council</b>							
21-31 new dwellings in Necton (BLR/2017/0001/	Awaiting decision	Not known. Application submitted November	1.0	<a href="http://planning.breckland.gov.uk/OnlineWeb/showDocuments?reference=BLR/2017/00">http://planning.breckland.gov.uk/OnlineWeb/showDocuments?reference=BLR/2017/00</a>	Medium	Yes	Sub-regional growth in housing as adopted by the region's Local Plans has been captured within TEMPro future year growth factors for 2022. Therefore, the cumulative effect of housing projects is

	Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale
PIP)		2017.		01/PIP&module=pl			inherent in the traffic and transport impact assessments.
4-8 new dwellings in Necton (BLR/2017/0002/PIP)	Awaiting decision	Not known. Application submitted November 2017.	1.0	<a href="http://planning.breckland.gov.uk/OcellaWeb/showDocuments?reference=BLR/2017/0002/PIP&amp;module=pl">http://planning.breckland.gov.uk/OcellaWeb/showDocuments?reference=BLR/2017/0002/PIP&amp;module=pl</a>	Medium	Yes	
70 dwellings (3PL/2016/0298/D) (Phase 2 of 3PL/2012/0576/O)	Approved (21/09/16)	Not known. Application submitted March 2016.	6.4	<a href="http://planning.breckland.gov.uk/OcellaWeb/planningDetails?reference=3PL/2016/0298/D&amp;from=planningSearch">http://planning.breckland.gov.uk/OcellaWeb/planningDetails?reference=3PL/2016/0298/D&amp;from=planningSearch</a>	Medium	Yes	Sub-regional growth in housing as adopted by the region's Local Plans has been captured within TEMPro future year growth factors for 2022. Therefore the cumulative effect of housing projects is inherent in the traffic and transport impact assessments.
98 dwellings at Swans Nest with access from Brandon Road (3PL/2017/1351/F) (Phase 3 of 3PL/2012/0576/O)	Awaiting decision (due 30/03/2018)	Not known. Application submitted Jan 2016.	6.4	<a href="http://planning.breckland.gov.uk/OcellaWeb/planningDetails?reference=3PL/2017/1351/F&amp;from=planningSearch">http://planning.breckland.gov.uk/OcellaWeb/planningDetails?reference=3PL/2017/1351/F&amp;from=planningSearch</a>	Medium	Yes	
175 dwellings with access at land to west of Watton Road,	Awaiting decision (due 13/10/2017)	Not known. Application submitted Jan 2016.	6.4	<a href="http://planning.breckland.gov.uk/OcellaWeb/planningDetails?reference=3PL/2016/0068">http://planning.breckland.gov.uk/OcellaWeb/planningDetails?reference=3PL/2016/0068</a>	Medium	Yes	

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
Swaffham (3PL/2016/0068/O) (Swans Nest Phase B)			/O				
Chapter 25 Noise and Vibration							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-Application	Expected construction date 2026	0 – projects are co-located	Pre-application outline only	High	Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction and operation. However, due to the strategic nature of developing the projects together, cumulative impacts are minimised. Refer to paragraph 240 in Chapter 25 Noise and Vibration.
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 – cable intersects project	Scoping Report: <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010080/EN010080-000065-Scoping%20Report.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010080/EN010080-000065-Scoping%20Report.pdf</a>  PEIR: <a href="http://www.dong">http://www.dong</a>	High	Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction where geographical footprints overlap and due to noise emissions from construction traffic

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
				<a href="http://energy.co.uk/en/Pages/PEIR-Documents.aspx">energy.co.uk/en/Pages/PEIR-Documents.aspx</a>			
Dudgeon Offshore Wind Farm	Commissioned	Constructed	0	<a href="http://dudgeonoffshorewind.co.uk/">http://dudgeonoffshorewind.co.uk/</a>	High	Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during operation.
Chapter 26 Air Quality							
National Infrastructure Planning							
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 – cable intersects project	Full PEIR available: <a href="http://hornseaproject3.co.uk/Documents-library/PEIR-Documents">http://hornseaproject3.co.uk/Documents-library/PEIR-Documents</a>	High	Yes	There is potential for the construction phases of Norfolk Vanguard and Hornsea Project Three to overlap. This project has therefore been considered in the air quality CIA.
Chapter 27 Human Health							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-application	Expected construction date 2026	0 – projects are co-located	Pre-application outline only	High	Yes	Overlapping proposed project boundaries may result in impacts of a direct and / or indirect nature during construction and operation.
Hornsea Project Three Offshore Wind Farm	Pre-application	Expected construction date 2021	0 – cable intersects project	Full PEIR available: <a href="http://hornseaproject3.co.uk/Documents-library/PEIR-Documents">http://hornseaproject3.co.uk/Documents-library/PEIR-Documents</a>	High	Yes	Overlapping proposed project boundaries at Reepham may result in impacts of a direct and / or indirect nature during construction and operation. There is also the potential for cumulative traffic impacts during construction.
Dudgeon Offshore Wind	Commissioned	Constructed	0	<a href="http://dudgeonoffshorewind.co.uk/">http://dudgeonoffshorewind.co.uk/</a>	High	Yes	The Dudgeon onshore cable route is to the north of Norfolk Vanguard, connecting

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
Farm						to the grid at Necton, on the same site as the connection for Norfolk Vanguard. Community comments received during consultation express frustration due to impacts from this project. Therefore, the cumulative impact will probably be felt more through a negative perception relating to communities.	
North Norfolk District Council							
Bacton Gas Terminal Extension	Approved	Approved 20/09/2016. Expires 20/09/2019.	3	Approved PDS available <a href="https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&amp;keyVal=_NNO RF_DCAPR_88689">https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&amp;keyVal=_NNO RF_DCAPR_88689</a>	Medium	Yes	Bacton Gas Terminal is situated to the north of Happisburgh and will therefore not have a direct impact on affected communities. However, as with other construction projects in this area, negative perceptions of these projects may influence people’s perceptions of the Norfolk Vanguard project and how they perceive impacts.
Bacton Gas Terminal coastal protection	Approved	Approved 18/11/2016. Expires 18/11/2019.	2.5	Approved PDS available	Medium	Yes	
Bacton and Walcott Coastal Management Scheme	Approved	Expected construction date 2018	1	Public information leaflets available: <a href="https://www.norfolk.gov.uk/m">https://www.norfolk.gov.uk/m</a>	Medium	Yes	

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
			edia/3371/bacton-to-walcott-public-information-booklet-july-2017.pdf				
Chapter 28 Onshore Archaeology and Cultural Heritage							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-Application	Expected construction date 2026	0 – projects are co-located	Pre-application outline only	High	Yes	Overlapping project boundaries may result in impacts of a direct and / or indirect nature.
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 – cable intersects project	Full PEIR available: <a href="http://hornseaproject3.co.uk/Documents-library/PEIR-Documents">http://hornseaproject3.co.uk/Documents-library/PEIR-Documents</a>	High	Yes	Overlapping project boundaries may result in impacts of a direct and / or indirect nature.
North Norfolk District Council							
Bacton Gas Terminal Extension	Approved	Approved 20/09/2016. Expires 20/09/2019	3.0	Approved PDS available <a href="https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&amp;keyVal=NNO">https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&amp;keyVal=NNO</a>	Medium	Yes	Proximity to Norfolk Vanguard project with potential impacts upon an area of high potential for geo-archaeological and / or palaeoenvironmental remains. Direct cumulative impacts may therefore occur to this resource, which is internationally renowned for its Lower Palaeolithic archaeological potential.

	Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale
				RF_DCAPR_88689			
Bacton Gas Terminal Coastal Protection	Approved	Approved 18/11/2016. Expires 18/11/2019	2.5	Approved PDS available	Medium	Yes	Proximity to Norfolk Vanguard project with potential impacts upon an area of high potential for geo-archaeological and / or palaeoenvironmental remains. Direct cumulative impacts may therefore occur to this resource, which is internationally renowned for its lower Palaeolithic archaeological potential.
Bacton and Walcott Coastal Management Scheme	Approved	Expected construction date 2018	1.0	Public information leaflets available: <a href="https://www.norfolk.gov.uk/media/3371/bacton-to-walcott-public-information-booklet-july-2017.pdf">https://www.norfolk.gov.uk/media/3371/bacton-to-walcott-public-information-booklet-july-2017.pdf</a>	Medium	Yes	Although there is no geographical overlap between the project boundaries, cumulative impacts of a direct or indirect nature may occur to deposits of geoarchaeological interest that are present and intersect both the onshore project area and the proposed Bacton and Walcott Coastal Management Scheme.
<b>Chapter 29 Landscape and Visual</b>							
<b>National Infrastructure Planning</b>							
Norfolk Boreas Offshore Wind Farm	Pre-Application	Expected construction date 2026	0 – projects are co-located	<a href="https://corporate.vattenfall.co.uk/norfolkboreas">https://corporate.vattenfall.co.uk/norfolkboreas</a>	High	Yes	Norfolk Boreas onshore project substation and National Grid substation extension would be sited adjacent to the respective onshore infrastructure of the Norfolk Vanguard project. There is the potential significant cumulative effects may arise in conjunction with this project and therefore it is included in the CIA.



Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 – cable intersects project  32km between substation locations	Full PEIR available: <a href="http://www.dongenergy.co.uk/en/Pages/PEIR-Documents.aspx">http://www.dongenergy.co.uk/en/Pages/PEIR-Documents.aspx</a>	High	Yes	Hornsea Project Three Offshore Wind Farm onshore cable route would cross the Norfolk Vanguard onshore cable route to the north-east of Reepham and construction compounds would be located near disused Oulton Airfield. Other onshore infrastructure would be sited in distant locations from Norfolk Vanguard onshore infrastructure. There is the potential significant cumulative effects may arise in conjunction with this project and therefore it is included in the CIA.
Chapter 30 Tourism and Recreation							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-Application	Expected construction date 2026	0 – projects are co-located	Pre-application outline only.	High	Yes	Impacts would relate to visual and noise impacts to onshore tourism and recreation assets, primarily concentrating around mobilisation areas and works at the project substation and National Grid extension. Cable landfall will be co-located for both projects and has been included in the impact assessment for this Chapter, therefore is not within the CIA. Any secondary infrastructure may have temporary noise/vibration impacts and long term visual impacts.
Hornsea Project Three Offshore Wind Farm	Pre-Application	Expected construction date 2021	0 – cable intersects project	Full PEIR available: <a href="http://www.dongenergy.co.uk/en/Pages/PEIR-Documents.aspx">http://www.dongenergy.co.uk/en/Pages/PEIR-Documents.aspx</a>	High	Yes	The Hornsea Project Three onshore cable route will cross the Norfolk Vanguard cable route. The exact location and manner of this crossing will determine the magnitude of cumulative impacts on local

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
			<a href="#">Documents.aspx</a>			tourism and recreation assets. Details of this crossing will be discussed with Orsted (formally DONG Energy), local stakeholders and the Local Planning Authority.	
North Norfolk District Council							
Bacton Gas Terminal Extension	Approved	Approved 20/09/2016. Expires 20/09/2019.	3	Approved PDS available <a href="https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&amp;keyVal=_NNO RF_DCAPR_88689">https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&amp;keyVal=_NNO RF_DCAPR_88689</a>	Medium	Yes	Cumulative impacts may occur with the projects at Bacton through creation of sediment plumes or decreased water quality. This is assessed in Chapter 9. Negative perceptions of these projects may influence people’s perceptions of the project and how they perceive impacts to community infrastructure. Although research shows that tourists have a generally positive view of wind farms, as detailed in section 30.6.6 of Chapter 30 Tourism and Recreation.
Bacton Gas Terminal coastal protection	Approved	Approved 18/11/2016. Expires 18/11/2019	2.5	Approved PDS available	Medium	Yes	
Bacton and Walcott Coastal Management Scheme	Approved	Expected construction date 2018	1.0	Public information leaflets available: <a href="https://www.norfolk.gov.uk/media/3371/bacton-to-walcott-public-">https://www.norfolk.gov.uk/media/3371/bacton-to-walcott-public-</a>	Medium	Yes	

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
				information-booklet-july-2017.pdf			
Chapter 31 Socio-economics							
National Infrastructure Planning							
Norfolk Boreas Offshore Wind Farm	Pre-application	Expected construction date 2026	0 – projects are co-located	Pre-application outline only	High	Yes	Impacts will relate to job creation and community infrastructure. The scale of impacts will depend on whether Norfolk Boreas onshore cable ducts are laid at the same time as Norfolk Vanguard or whether cable route will need to be partially excavated to install second ducts. It is assumed landfall will be the same place but any secondary infrastructure or extensions may have temporary noise/vibration impacts and long term visual impacts.
Hornsea Project Three Offshore Wind Farm	Pre-application	Expected construction date 2021	0 – cable intersects project	Full PEIR available: <a href="http://hornseaproject3.co.uk/Documents-library/PEIR-Documents">http://hornseaproject3.co.uk/Documents-library/PEIR-Documents</a>	High	Yes	It is anticipated that Hornsea’s onshore cable route will cross the Norfolk Vanguard cable route. How this interaction of construction is managed will determine the magnitude of impacts on community infrastructure. However, in general the socio-economic impacts of due to construction and operation parallel those described in this chapter.
Dudgeon	Commissioned	Constructed	0	<a href="http://dudgeonof">http://dudgeonof</a>	High	Yes	The Dudgeon onshore cable route is to

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale	
Offshore Wind Farm			fshorewind.co.uk/			the north of Norfolk Vanguard, connecting to the grid at Necton, on the same site as the connection for Norfolk Vanguard. Community comments received during consultation express frustration due to impacts from this project. Therefore, the cumulative impact will probably be felt more through a negative perception relating to communities and community infrastructure.	
North Norfolk District Council							
Bacton Gas Terminal Extension	Approved	Approved 20/09/2016. Expires 20/09/2019.	3	Approved PDS available <a href="https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&amp;keyVal=_NNO RF_DCAPR_88689">https://idoxpa.norfolk.gov.uk/online-applications/applicationDetails.do?activeTab=summary&amp;keyVal=_NNO RF_DCAPR_88689</a>	Medium	Yes	Bacton Gas Terminal is situated to the north of Happisburgh and will therefore not have a direct impact on community infrastructure. However, as with other construction projects in this area, negative perceptions of these projects may influence people’s perceptions of the Norfolk Vanguard project and how they perceive impacts to community infrastructure.
Bacton Gas Terminal coastal protection	Approved	Approved 18/11/2016. Expires 18/11/2019.	2.5	Approved PDS available	Medium	Yes	
Bacton and Walcott Coastal	Approved	Expected construction	1	Public information leaflets available:	Medium	Yes	

Status	Development period	<sup>1</sup> Distance from Norfolk Vanguard (km)	Project definition	Project data status	Included in CIA	Rationale
Management Scheme		date 2018		<a href="https://www.norfolk.gov.uk/media/3371/bacton-to-walcott-public-information-booklet-july-2017.pdf">https://www.norfolk.gov.uk/media/3371/bacton-to-walcott-public-information-booklet-july-2017.pdf</a>		

### 33.5 Cumulative Impact Assessment Summary

33. The sections below detail the cumulative impacts which were considered for each onshore technical chapter, and their associated significance. Details on the impact assessments undertaken and any associated mitigation required can be found within each onshore technical chapter.

#### 33.5.1 Ground Conditions and Contamination

34. Table 33.4 provides a summary of the CIA outcomes for ground conditions and contamination. All plans and projects with the potential for cumulative impacts identified for ground conditions and contamination are presented in Table 33.3.

**Table 33.4 Potential cumulative impacts identified for ground conditions and contamination**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
<b>Construction</b>		
Impacts to coast line, including designated geological sites.	Impacts to interest features of designated sites may be exacerbated by other projects.	<b>No impact</b>
Contamination of secondary aquifers as a result of construction activities.	Impacts to secondary aquifers may be exacerbated by other projects.	<b>No impact</b>
Impacts on groundwater quality in the Principal Aquifer (including SPZ areas) due to open cut trench construction.	Impacts to Principal Aquifer including Source Protection Zone (SPZ) areas may be exacerbated by other projects.	<b>No impact</b>
Impacts on groundwater quality in the Principal Aquifer (including SPZ areas) resulting from trenchless crossing technique (e.g.HDD) conduit construction and piling.	Impacts to Principal Aquifer including SPZ areas may be exacerbated by other projects.	<b>No impact</b>
Impacts on the quantity and quality of surface waters fed by groundwater during construction.	Impacts to surface water may be exacerbated by other projects.	<b>No impact</b>
Sterilisation of mineral resources.	Impacts to Mineral Safeguard Areas may be exacerbated by other projects.	<b>No impact</b>
Impacts on shallow groundwater due to changes to the hydraulic regime as a result of the construction works	Impacts to groundwater may be exacerbated by other projects.	<b>No impact</b>

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
<b>Operation</b>		
Impacts during O&M are scoped out of the ES as agreed during the scoping stage (see Table 19.2 in Chapter 19 Ground Conditions and Contamination).		
<b>Decommissioning</b>		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

### 33.5.2 Water Resource and Flood Risk

35. Table 33.5 provides a summary of the CIA outcomes for water resources and flood risk. All plans and projects with the potential for cumulative impacts identified for water resources and flood risk are presented in Table 33.3.

**Table 33.5 Potential cumulative impacts identified for water resources and flood risk**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
Construction		
Direct disturbance of surface water bodies	Impacts to water bodies may be exacerbated by other projects	Minor – Moderate adverse
Increased sediment supply		Minor – Moderate adverse
Accidental release of fuels, oils, lubricants, foul waters and construction materials		Minor adverse
Increased surface water runoff and flood risk		Minor adverse
Operation		
Increased surface water runoff and altered groundwater flows	Impacts to water bodies may be exacerbated by other projects	Negligible – Minor adverse
Supply of fine sediment and other contaminants		Minor adverse

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
Decommissioning		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

36. Whilst some cumulative impacts are assessed as moderate adverse significance, these are no greater than those identified for the Norfolk Vanguard alone. Potential impacts relate to direct disturbance of watercourses and increased sediment input, both at a sub-catchment level. The identified moderate adverse impacts relate to the high value sub-catchments, which will be subject to multiple watercourse crossings during construction.
37. Mitigation measures have been identified including a commitment to trenchless crossing techniques for sensitive watercourses, sediment management, construction surface water drainage, and implementation of best practice measures set out in the Code of Construction Practice (DCO requirement 20). With the implementation of these measures the magnitude of potential impacts is reduced to low to negligible in all cases. However, due to the high value of these receptors this represents impacts an impact of moderate adverse significance.

### 33.5.3 Land Use and Agriculture

38. Table 33.6 provides a summary of the CIA outcomes for land use and agriculture. All plans and projects with the potential for cumulative impacts identified for land use and agriculture are presented in Table 33.3.

**Table 33.6 Potential cumulative impacts identified for land use and agriculture**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
Construction		
Drainage	Cumulative direct impacts arising from two or more projects are possible given the level of uncertainty regarding the presence and location of drainage systems. Impacts may occur to individual field drains in any area of overlap or those with an extent which intersects two or more proposed development boundaries (where groundworks are anticipated).	<b>Minor adverse</b>



Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
Land taken out of existing use	Cumulative direct impacts arising from two or more projects are possible. Impacts may occur where project boundaries overlap spatially or temporally on the same landowner/occupier's land. Such impacts have the potential to affect local productivity (e.g. loss of earnings from more than one project taking the same parcels of land out of use). Changes to ALC grades of land may also occur as an indirect impact.	<b>Minor adverse</b>
Natural resource - soil	Cumulative direct impacts arising from two or more projects are possible. Impacts may occur where project boundaries overlap spatially or temporally on the same landowner/occupier's land. Such impacts have the potential to affect local productivity (e.g. loss of earnings from more than one project taking the same parcels of land out of use). Changes to ALC grades of land may also occur as an indirect impact.	<b>Negligible</b>
Soil erosion	Cumulative direct impacts arising from two or more projects are possible. Impacts may occur where project boundaries overlap spatially or temporally on the same landowner/occupier's land. Such impacts have the potential to affect local productivity (e.g. loss of earnings from more than one project taking the same parcels of land out of use). Changes to ALC grades of land may also occur as an indirect impact.	<b>Negligible</b>
Environmental Stewardship Scheme (ESSs)	Cumulative direct impacts arising from two or more projects are possible. Impacts may occur where project boundaries overlap spatially or temporally on the same landowner/occupier's land. Such impacts have the potential to affect land under ESS (e.g. loss of earnings from ESS more than one project taking the same parcels of land out of use).	<b>Negligible</b>
<b>Operation</b>		
Permanent change to land use		<b>Negligible</b>
ESS		<b>Negligible</b>
<b>Decommissioning</b>		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

### 33.5.4 Onshore Ecology

39. Table 33.7 provides a summary of the CIA outcomes for onshore ecology. All plans and projects with the potential for cumulative impacts identified for onshore ecology are presented in Table 33.3.

**Table 33.7 Potential cumulative impacts identified for onshore ecology**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
<b>Construction</b>		
Statutory designated sites	Impacts to interest features of designated sites may be exacerbated by other projects	<b>Minor adverse</b>
Non-statutory designated sites	Impacts to interest features of designated sites may be exacerbated by other projects	<b>Negligible</b>
Arable land	Loss of habitat due to other projects may increase the cumulative loss of habitat within the county	<b>Minor adverse</b>
Woodland, trees and scrub	Loss of habitat due to other projects may increase the cumulative loss of habitat within the county	<b>Negligible</b>
Hedgerows	Loss of habitat due to other projects may increase the cumulative loss of habitat within the county	<b>Moderate adverse</b>
Grassland	Loss of habitat due to other projects may increase the cumulative loss of habitat within the county	<b>Minor adverse</b>
Watercourses and ponds	Loss of habitat due to other projects may increase the cumulative loss of habitat within the county	<b>Minor adverse</b>
Badgers	Impact to species due to other projects may increase the cumulative impacts to species within the county	<b>Minor adverse</b>
Bats	Impact to species due to other projects may increase the cumulative impacts to species within the county	<b>Moderate adverse</b>
Water vole	Impact to species due to other projects may increase the cumulative impacts to species within the county	<b>Minor adverse</b>
Otter	Impact to species due to other projects may increase the cumulative impacts to species within the county	<b>Minor adverse</b>
Great crested newts	Impact to species due to other projects may increase the cumulative impacts to species within the county	<b>Minor adverse; Moderate adverse for unsurveyed areas</b>
Reptiles	Impact to species due to other projects may increase	<b>Minor adverse</b>

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
	the cumulative impacts to species within the county	
Other invertebrates	Impact to species due to other projects may increase the cumulative impacts to species within the county	<b>Minor adverse</b>
Protected flora	Impact to species due to other projects may increase the cumulative impacts to species within the county	<b>No impact</b>
Invasive non-native species	Other projects may exacerbate the risk from invasive species within the county	<b>Minor adverse</b>
<b>Operation</b>		
Habitat and species during maintenance	Impact to species due to other projects may increase the cumulative impacts to species within the county	<b>Negligible</b>
Fauna during operational lighting and noise	Impact to species due to other projects may increase the cumulative impacts to species within the county	<b>Negligible</b>
<b>Decommissioning</b>		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

40. The cumulative impacts identified are no greater than those identified for the Norfolk Vanguard alone. It is considered that moderate adverse cumulative impacts will remain after mitigation for bats (loss of connective hedgerow habitat) and hedgerows, but these impacts will reduce to non-significant over time as replacement hedgerows mature. Potential moderate adverse cumulative impacts have also been identified for great crested newts within areas that have yet to be surveyed. This is a function of taking a precautionary approach and assuming that the five ponds directly impacted by the project would all support breeding populations of great crested newts.
41. Mitigation measures have been identified, as detailed in the outline landscape and ecological management strategy (OLEMS) (document reference 8.7), and implementation of best practice measures set out in the Code of Construction Practice (DCO requirement 20). With the implementation of these measures the magnitude of potential impacts is reduced to low to negligible in all cases. However, due to the high value of these receptors the impacts are considered to be of moderate adverse significance.

### 33.5.5 Onshore Ornithology

42. Table 33.8 provides a summary of the CIA outcomes for onshore ornithology. All plans and projects with the potential for cumulative impacts identified for onshore ornithology are presented in Table 33.3.

**Table 33.8 Potential cumulative impacts identified for onshore ornithology**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
Construction		
Statutory designated sites	Impacts to interest features of designated sites may be exacerbated by other projects	Minor adverse
Wintering / on passage bird species		Minor adverse
Breeding bird species		Minor adverse
Operation		
Disturbance to habitats and species from maintenance activities	Impacts to interest features of designated sites may be exacerbated by other projects	Negligible
Disturbance to onshore ornithology from operational lighting and noise		Negligible
Decommissioning		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

### 33.5.6 Traffic and Transport

43. Table 33.9 provides a summary of the CIA outcomes for traffic and transport. All plans and projects with the potential for cumulative impacts identified for traffic and transport are presented in Table 33.3.

**Table 33.9 Potential cumulative impacts identified for traffic and transport**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
<b>Construction</b>		
Severance	Cumulative impacts arising from two or more projects	<b>Negligible –</b>

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
	are possible due to the increase in traffic from the projects.	<b>Moderate adverse</b>
Pedestrian amenity		<b>Minor – Moderate adverse</b>
Road safety		<b>Minor adverse</b>
Driver delay		<b>Minor adverse</b>
Operation		
No cumulative impacts are anticipated as there are no operational impacts associated with Norfolk Vanguard.		
Decommissioning		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

44. The cumulative impacts identified are no greater than those identified for the Norfolk Vanguard alone. The assessed moderate adverse impacts in relation to severance and pedestrian amenity relate to a single road (Link 69). This road is not wide enough to allow two-way construction traffic and as such is considered to be receptor of high sensitivity.
45. A Traffic Management Plan (TMP) (DCO requirement 21) will be developed and agreed with the relevant Highways Authorities with measures for managing the HGV movements on this sensitive highway link.

### 33.5.7 Noise and Vibration

46. Table 33.10 provides a summary of the CIA outcomes for noise and vibration. All plans and projects with the potential for cumulative impacts identified for noise and vibration are presented in Table 33.3.

**Table 33.10 Potential cumulative impacts identified for noise and vibration**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
<b>Construction</b>		
Other consented developments and their associated road traffic.	There is potential for impacts associated with noise and vibration generated during the construction phase site works to lead to a cumulative impact with other	<b>No impact</b>

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
	<p>proposed developments (already consented and those in the planning system) where the construction phases of other schemes overlap with Norfolk Vanguard and where activities will occur in proximity to the same receptors.</p> <p>There is a potential for a cumulative impact associated with construction phase road traffic to occur during the project construction in conjunction with other proposed schemes. Further details are contained within Chapter 24 Traffic and Transport.</p>	
<b>Operation</b>		
Other onshore electrical infrastructure within the vicinity of the onshore project substation	There is a potential for a cumulative impact associated with operational phase to occur during operation of the onshore project substation in conjunction with other operational noise sources within the vicinity of the onshore project substation. Implementation of appropriate mitigation within the detail design should ensure that any impacts will be of negligible significance.	<b>No impact</b>
<b>Decommissioning</b>		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

### 33.5.8 Air Quality

47. Table 33.11 provides a summary of the CIA outcomes for air quality. All plans and projects with the potential for cumulative impacts identified for air quality are presented in Table 33.3.

**Table 33.11 Potential cumulative impacts identified for air quality**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
<b>Construction</b>		
Construction dust and fine particulate matter	There is potential for cumulative construction dust impacts where projects occur within 700m of each other.	<b>No impact</b>
Construction phase road traffic	Where the construction phase of the project overlaps with other projects, there is the potential for	<b>No impact</b>

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
emissions	cumulative impacts associated with project-generated traffic emissions on the local road network.	
Decommissioning		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

### 33.5.9 Human Health

48. The Human Health chapter takes a different approach to the methodology used for the CIA described in Chapter 6 EIA Methodology.
49. The cumulative assessment considers the inter-relationships between health effects both from within the project and in combination with effects from other projects. These are considered for:
  - Project geographies:
    - Landfall;
    - Cable route;
    - Onshore project substation;
    - National Grid extension and overhead line temporary works;
    - Locally, regional, and nationally.
  - For the following vulnerable populations:
    - Children and young people;
    - Older people;
    - People with existing poor health; and
    - People living in deprivation.
50. Firstly the intra-project cumulative effects are considered. The aim of this step is to understand if different effects on health determinants from the same project would cumulatively create a larger health effect. For example, at a section of the project would changes to noise levels, traffic density, and air quality combine to provide a more significant effect than on their own.
51. Secondly the inter-project cumulative effects are considered. As with other chapters, projects are screened for assessment based on a list agreed with Norfolk County Council. Projects are then considered for cumulative effects at different locations and for different vulnerable populations.

52. Table 33.12 provides a summary of the CIA outcomes for human health. All plans and projects with the potential for cumulative impacts identified for air quality are presented in Table 33.3.

**Table 33.12 Potential cumulative human health influences**

Potentially effected population	Potential cumulative health influences	Cumulative impact significance	
Intra-project cumulative effect			
Population near landfall	<ul style="list-style-type: none"><li>Noise;</li><li>Air quality;</li><li>Physical activities;</li><li>Indirect Employment; and</li><li>Journey times or reduced access.</li></ul>	General population	Negligible
		Vulnerable population	Minor adverse
Population along the onshore cable route	<ul style="list-style-type: none"><li>Noise;</li><li>Air quality;</li><li>Physical activities</li><li>Indirect Employment; and</li><li>Journey times or reduced access.</li></ul>	General population	Negligible
		Vulnerable population	Minor adverse
Population near the onshore project substation and National Grid substation extension	<ul style="list-style-type: none"><li>Noise;</li><li>Air quality;</li><li>Physical activities;</li><li>Indirect Employment;</li><li>EMF; and</li><li>Journey times or reduced access.</li></ul>	General population	Negligible
		Vulnerable population	Minor adverse
Children and young people	<ul style="list-style-type: none"><li>Noise;</li><li>Air quality;</li><li>Physical activities; and</li><li>Journey times or reduced access.</li></ul>	Negligible.	
Older people	<ul style="list-style-type: none"><li>Noise;</li><li>Air quality;</li><li>Physical activities;</li><li>EMF; and</li><li>Journey times or reduced access.</li></ul>	Minor adverse	
People with existing poor health (physical and mental)	<ul style="list-style-type: none"><li>Noise;</li><li>Air quality;</li><li>Physical activities;</li><li>EMF; and</li><li>Journey times or reduced access.</li></ul>	Minor adverse	
People living in deprivation, including those on low incomes	<ul style="list-style-type: none"><li>Noise;</li><li>Air quality;</li><li>Physical activities;</li><li>Employment; and</li><li>Journey times or reduced access.</li></ul>	Negligible	
Inter-project cumulative effect			



Potentially effected population	Potential cumulative health influences	Cumulative impact significance	
Population near landfall	<ul style="list-style-type: none"> <li>Norfolk Boreas; and</li> <li>Bacton Gas terminal extension;</li> <li>Bacton Gas terminal extensions coastal protection; and</li> <li>Bacton Coastal Management.</li> </ul>	General population	<b>Negligible</b>
		Vulnerable population	<b>Minor adverse</b>
Population along the cable route	<ul style="list-style-type: none"> <li>Norfolk Boreas;</li> <li>Dudgeon; and</li> <li>Hornsea Project 3.</li> </ul>	General population	<b>Negligible</b>
		Vulnerable population	<b>Minor adverse</b>
Population near the onshore project substation	<ul style="list-style-type: none"> <li>Norfolk Boreas; and</li> <li>Dudgeon.</li> </ul>	General population	<b>Negligible</b>
		Vulnerable population	<b>Minor adverse</b>
Local – Population of North Norfolk, Broadland and Breckland Districts Regional – Population of Norfolk County	<ul style="list-style-type: none"> <li>Norfolk Boreas;</li> <li>Dudgeon;</li> <li>Hornsea Project 3.</li> <li>Bacton Gas terminal extension;</li> <li>Bacton Gas terminal extensions coastal protection; and</li> <li>Bacton Coastal Management.</li> </ul>	General population	<b>Negligible</b>
		Vulnerable population	<b>Minor adverse</b>
National and International – Population of England and beyond the borders of England	<ul style="list-style-type: none"> <li>Norfolk Boreas;</li> <li>Dudgeon; and</li> <li>Hornsea Project 3.</li> </ul>	<b>Moderate beneficial</b>	
Potential vulnerable groups, Children and young people	<ul style="list-style-type: none"> <li>Noise;</li> <li>Air quality;</li> <li>Physical activities; and</li> <li>Journey times or reduced access.</li> </ul>	<b>Negligible</b>	
Older people	<ul style="list-style-type: none"> <li>Noise;</li> <li>Air quality;</li> <li>Physical activities;</li> <li>EMF; and</li> <li>Journey times or reduced access.</li> </ul>	<b>Minor adverse</b>	
People with existing poor health (physical and mental)	<ul style="list-style-type: none"> <li>Noise;</li> <li>Air quality;</li> <li>Physical activities;</li> <li>EMF; and</li> </ul>	<b>Minor adverse</b>	

Potentially effected population	Potential cumulative health influences	Cumulative impact significance
	<ul style="list-style-type: none"> <li>Journey times or reduced access.</li> </ul>	
People living in deprivation, including those on low incomes	<ul style="list-style-type: none"> <li>Noise;</li> <li>Air quality;</li> <li>Physical activities;</li> <li>Employment; and</li> <li>Journey times or reduced access.</li> </ul>	<b>Negligible</b>

### 33.5.10 Onshore Archaeology and Cultural Heritage;

53. Table 33.13 provides a summary of the CIA outcomes for onshore archaeology and cultural heritage. All plans and projects with the potential for cumulative impacts identified for onshore archaeology and cultural heritage are presented in Table 33.3.

**Table 33.13 Potential cumulative impacts identified for onshore archaeology and cultural heritage**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
<b>Construction</b>		
Direct impact on buried archaeological remains	Cumulative direct impacts arising from two or more projects are possible given the level of uncertainty regarding the nature and extent of the potential archaeological resource. Impacts may occur to individual archaeological features in an area of over-lap or those with an extent which intersects two or more project boundaries (where groundworks are anticipated). The nature of the buried archaeological resource on a wider scale may also be affected.	<b>No impact</b>
Direct impact on above ground archaeological remains	Cumulative direct impacts arising from two or more projects are possible. Impacts may occur to non-designated heritage assets or individual archaeological features (e.g. earthworks). Such impacts have the potential to affect the HLC of the study area (e.g. loss of earthworks and / or historic field boundaries as a result of one project could affect the HLC as summarised for the purposes of another project).	<b>No impact</b>
Indirect impact on the setting of heritage assets	Cumulative indirect impacts arising from two or more projects are possible, particularly in the event that the construction of two or more projects is concurrent and within sight of an individual heritage asset or group of heritage assets, although additional (external) factors affecting setting may also occur.	<b>Negligible to minor adverse</b>
Impact on potential geoarchaeological /	Cumulative direct impacts arising from two or more projects are possible. Impacts may occur to geo-	<b>Negligible</b>

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
palaeoenvironmental remains	archaeological / palaeoenvironmental remains where deposits of geoarchaeological importance present within two or more project boundaries are directly impacted as the result of groundworks.	
Operation		
Indirect impact on the setting of heritage assets	Cumulative indirect impacts arising from two or more projects are possible, particularly in the event that the infrastructure of two or more projects occurs within sight of an individual heritage asset or group of heritage assets, although additional (external) factors affecting setting may also occur.	<b>Minor adverse (as a WCS), but generally No impact</b>
Decommissioning		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

### 33.5.11 Landscape and Visual Impact Assessment

54. Table 33.14 provides a summary of the CIA outcomes for landscape and visual impact assessment. All plans and projects with the potential for cumulative impacts identified for landscape and visual impact assessment are presented in Table 33.3.

**Table 33.14 Potential cumulative impacts identified for landscape and visual impacts**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
Construction		
Construction of onshore cable route	Potential cumulative impact on visual amenity of walkers relating to Norfolk Vanguard and Norfolk Boreas projects.	There is the potential that the construction of the Hornsea Three onshore cable route could be constructed at the same time as the Norfolk Vanguard onshore cable route. There is the potential cumulative impact on visual amenity of walkers relating to Norfolk Vanguard and Norfolk Boreas projects.
		Marriott's Way
		None. Effect short term and reversible.
Operation		

Potential Impact		Rationale for potential cumulative impact	Cumulative Impact Significance	
Operation of onshore project substation	Potential cumulative impact on landscape character relating to Norfolk Vanguard and Norfolk Boreas projects.	There is the potential that Norfolk Vanguard onshore project substation and National Grid substation extension, and Norfolk Boreas onshore project substation and National Grid substation extension would be operational concurrently and this could give rise to significant cumulative effects.	Plateau Farmland LCT: Pickenham Plateau LCU	None after 20 years. Significant effect long term (20 years) and reversible in localised area.
			Settled Tributary Farmland LCT: River Wissey LCU	
			Plateau Farmland LCT: Beeston Plateau	
	Potential cumulative impact on visual amenity of road-users relating to Norfolk Vanguard and Norfolk Boreas projects.		VP1 Ivy Todd Road (west)	None after 25 years. Significant effect long term (25 years) and reversible over 10m section.
	Potential cumulative impact on visual amenity of walkers relating to Norfolk Vanguard and Norfolk Boreas projects.		VP2 Lodge Lane (south)	None after 20 years. Significant effect long term (20 years) and reversible over 550m section. Beneficial effect for remaining 10 years
Decommissioning				
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.				

### 33.5.12 Tourism and Recreation

Table 33.15 provides a summary of the CIA outcomes for tourism and recreation. All plans and projects with the potential for cumulative impacts identified for tourism and recreation are presented in Table 33.3.

**Table 33.15 Potential cumulative impacts identified for tourism and recreation**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
<b>Construction</b>		
Increased marine construction traffic affecting attractiveness of the coastline for Tourism and recreation.	Although the project is located far enough offshore that it will not be visible from shore, there are other wind farms in the region that are visible. The short-term temporary offshore cable laying activities for Norfolk Vanguard will also be visible from shore. This may create a perception in tourists that the coastline is despoiled although research shows that tourists have a generally positive view of wind farms, as detailed in section 30.6.6 of Chapter 30 Tourism and Recreation.	<b>Negligible</b>
Disruption of marine recreational activities including sailing and other water sports	As discussed in Chapter 15 Shipping and Navigation, there is potential for cumulative impacts with other offshore wind farms in the southern North Sea with regards to vessel routing / displacement, increased vessel to vessel collision risk and increased vessel to structure collision risk and diminished emergency response time.	<b>No Impact</b>
Deterioration to Bathing Water / Blue Flag beaches and resulting effect on Tourism and Recreation	As with visual impacts, although the project will not have a direct impact on Blue Flag beaches, the perception of tourists due to other developments (such as the Bacton Gas Terminal landscaping and Norfolk Boreas offshore wind farm) may create the perception that the area is becoming over developed; although research shows that tourists have a generally positive view of wind farm development, as detailed in section 30.6.6 of Chapter 30 Tourism and Recreation.	<b>No Impact</b>
Disruption to onshore coastal recreational and tourism assets	Depending on the timing of the works with regards the Bacton Gas Terminal and landfall works associated with Norfolk Vanguard and Norfolk Boreas there may be cumulative disruption to recreational marine users.	<b>Minor adverse</b>
Visual impacts of construction activity	Depending on the timings of the works for Hornsea 3, there may be cumulative impacts during construction works associated with the cable route of for Norfolk Vanguard. There will be cumulative impacts due to the onshore project substation for Norfolk Boreas although these have been minimised by Norfolk Vanguard	<b>Minor adverse</b>

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
	undertaking the preparatory works along the rest of the cable route.	
Reduction of tourist accommodation availability due to non-resident work force	Depending on timing of works with respect other large infrastructure projects there may be an accumulation of non-resident workers residing within Norfolk during high season months.	<b>Negligible</b>
Obstruction or disturbance to inland tourism and recreation assets	This will depend on the phasing of works with respect other projects with the potential for interaction.	<b>Minor adverse</b>
Obstruction or disturbance to users of paths or non-motorised routes	This will depend on the phasing of works with respect other projects with the potential for interaction; cumulative impacts may occur with the onshore cable routes of other offshore wind farms (Norfolk Boreas, Hornsea Three and Dudgeon) in the surrounding area.	<b>Negligible to Minor adverse</b>
Traffic increase	This will depend on the phasing of works with respect to Hornsea Project Three and coastal works at Bacton.	Currently there is insufficient publicly available information to undertake a Cumulative Impact Assessment.
<b>Operation</b>		
Obstruction or disturbance to marine recreation	Once constructed, it is assumed that impacts will be negligible so ongoing obstruction of marine recreation is unlikely for recreation vessels.	<b>No Impact</b>
Visual and noise impacts on land-based tourism and recreation assets	Once constructed, it is assumed that these impacts will be negligible so ongoing obstruction of recreation is unlikely. However, if not managed properly, the perception of the value visitors have for rural Norfolk tourism may reduce which may lead to a reduction in tourist numbers.	<b>Negligible</b>
<b>Decommissioning</b>		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

### 33.5.13 Socio-economics

55. Table 33.16 provides a summary of the CIA outcomes for socio-economics. All plans and projects with the potential for cumulative impacts identified for socio-economics are presented in Table 33.3.

**Table 33.16 Potential cumulative impacts identified for socio-economics**

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
<b>Construction</b>		
Onshore direct job creation	An ongoing succession of onshore construction could provide confidence to the construction market and drive investment.	<b>Moderate beneficial</b>
Onshore supply chain job creation	A strategically developed supply chain of Tier 2 and 3 businesses could provide confidence to the fabrication market and drive investment.	
Effects on community infrastructure	All projects considered create construction noise and other disturbances to rural areas of Norfolk on a temporary basis. Increased traffic is considered to be an area that may have significant effect on some community infrastructure and a small number of businesses in two areas of the cable route.	<b>Minor adverse</b>
<b>Operation</b>		
Onshore direct employment and supply chain job creation (see below for details)	It is estimated that 7,350 direct and indirect FTE jobs will be created as part of regional offshore wind farm development (Table 31.29 of Chapter 31 Socio-economics and Appendix 31.2). A strategic approach taken between developers and New Anglia LEP (Local Enterprise Partnership) could lead to significant investment in to supply chain and human resource development for O&M services to the offshore wind farm sector. Especially as part of a process to re-skill workers from the oil and gas sector.	<b>Major beneficial</b>
Effects on community infrastructure	Onshore infrastructure will primarily be underground. However, an increase in industrial infrastructure will have a lasting visual impact for local community assets. Noise impacts may be considerable and this pathway could have a lasting impact on community infrastructure if not properly mitigated.	<b>Negligible</b>
<b>Decommissioning</b>		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be		

Potential Impact	Rationale for potential cumulative impact	Cumulative Impact Significance
provided. As such, cumulative impacts during the decommissioning stage are assumed to be the same as those identified during the construction stage.		



### 33.6 References

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