East Anglia
Offshore Wind

VATTENFALL

SCOTTISHPOWER
RENEWABLES

East Anglia THREE

Chapter 18

Infrastructure and Other Users

Environmental Statement
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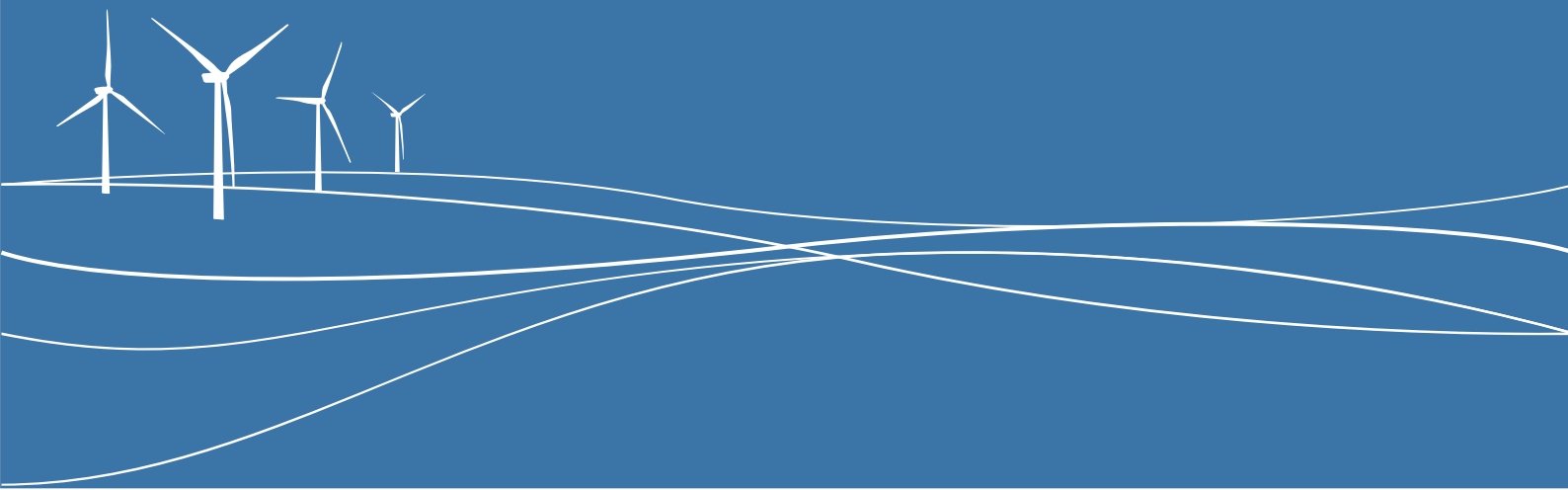

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18 INFRASTRUCTURE AND OTHER USERS

18.1 Introduction

1. This Chapter of the Environmental Statement (ES) describes the other human activities (with marine components) occurring within or potentially affected by the offshore elements of the proposed East Anglia THREE project including other offshore windfarm projects, oil and gas activity, marine aggregate extraction, marine disposal sites, military exercise areas (note military aviation is addressed in Chapter 16 Aviation and Ministry of Defence (MOD)), telecommunications and electricity cables, pipelines, port developments, capital and maintenance dredging, and unexploded ordnance (UXO). Other activities which require more detailed stand-alone consideration are covered in Chapter 14 Commercial Fisheries, Chapter 15 Shipping and Navigation and Chapter 16 Aviation and MOD.

2. The Chapter provides an assessment of the potential impacts of the proposed East Anglia THREE project on these receptors over the construction, operation and decommissioning phases, along with proposed mitigation measures, where considered necessary. This chapter has been prepared by Royal HaskoningDHV.

3. This chapter is also supported by the figures listed above which are presented in Volume 2 of this ES.

4. This chapter has taken account of guidance provided in the National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3). The NPS guidance notes relevant to Infrastructure and other users are described in detail in *Table 18.3*.

18.2 Consultation

5. *Table 18.1* summarises relevant issues raised and advice given during consultation. Consultation relevant to Infrastructure and Other Users has occurred through several processes. Formal consultation included the request for a Scoping Opinion from the relevant statutory consultees through the Planning Inspectorate (the Planning Inspectorate 2012) and the Section 42 consultation on both the Preliminary Environmental Information Report (PEIR) and the Phase III report (consultation). Targeted consultation was also held with specific other sea users or groups and has been conducted through meetings to address specific issues. In addition, although not directed specifically at East Anglia THREE, consultation undertaken for the East Anglia ONE project has also been taken into account where it is considered relevant. Further details of all consultation can be found in the Consultation Report which forms part of the Development Consent Order (DCO) application.

6. *Table 18.1* contains responses provided in the Scoping Opinion and relevant consultation responses from East Anglia ONE. The table also indicates which section(s) of this or other chapters address the issues raised.

Table 18.1 Consultation Responses

Consultee	Date /Document	Comment	Response / where addressed in this ES
Scoping Opinion			
Rijkswaterstaat (Ministry of Infrastructure & Environment, the Netherlands)	December 2012	The Netherlands are in the process of designating two wind areas; Hollandse kust and Ten Noorden van de Waddeneilanden. These zones currently hold the status of 'search area' for offshore wind in the National Water policy Plan. This means that there is a process assessing the possibility for wind parks in that area. "We are planning to designate wind areas within these search areas at the end of 2013. During the process of designating these areas, we will contact the British Authorities within the framework of the EIA consultation have past that stage already and currently hold the status of development zone."	These areas were designated in 2013 and were undergoing consultation before they were due to be presented as part of the "wind energy vision at sea" to parliament in Q2 2014. The Ten Noorden van de Waddeneilanden site has since ruled this out due to conflicts with MOD land. The Hollandse Kust area is due for review post 2020 due to the expense of developing that far offshore (4C Offshore). There are no transboundary impacts predicted for infrastructure and other users.
Rijkswaterstaat (Ministry of Infrastructure & Environment, the Netherlands)	December 2012	The construction of the East Anglia offshore windfarm with the presence of and construction of future offshore wind farms in the region (such as other round 3 offshore wind farms in the UK and wind farms planned in Belgium, Germany and the Netherlands) may result in significant cumulative ecological impacts. The Dutch government is starting to seek common grounds with UK governmental authorities to	Cumulative impacts (including consideration of windfarms outside UK waters) to Benthic Ecology, Fish and Shellfish, Marine Mammals and Ornithology are considered in chapters 10, 11,12 and 13 within this ES

Consultee	Date /Document	Comment	Response / where addressed in this ES
		discuss how cumulative impacts should be taken into account. This might influence future developments of wind farms in a broader context.	
Secretary of State	December 2012	The initiation of UXO or the works that would be involved in removing any identified UXO could have environmental impacts and therefore the SoS advises that should the geophysical survey identify the presence of any UXO, an assessment of the potential impacts should be undertaken. The implementation of mitigation to avoid potential impacts should also be considered within the ES.	Mitigation and management discussed in section 18.4.1
Section 42 Consultation			
Vodafone	July 2015, Phase III report (consultation)	Please can you provide the turbine coordinates to enable us to assess this?	Exact locations of the turbines have not yet been determined, an explanation of this was sent to Vodafone along with the coordinates of the East Anglia THREE site (and onshore electrical transmission works).
OSPAR	July 30, 2014 and June 29, 2015 e-mail correspondence	OSPAR responded to an email request by EATL for further information on a munitions dump site as follows: The site is a conventional munitions, which includes, but is not limited to, bombs, grenades, torpedoes and mines; Information on quantity is very difficult to determine as the munitions were dumped/jettisoned from vessels following WWI and WWII and the records	This information has been included into section 18.6.9.

Consultee	Date /Document	Comment	Response / where addressed in this ES
		are not necessarily complete.	
ENI UK Ltd	July 2015 Meeting	ENI provided EATL with information locations they may wish to drill prospective wells, one of these was within the East Anglia THREE site but their current focus in on a well that is outside of the East Anglia THREE site	Section 18.5
Verizon	10/06/2014	I note under Chapter 18, table 18.2, Verizon comments are included – but please note these have not been reproduced in full, but more importantly they relate to communication with your colleague on East Anglia ONE (first attachment refers). Thus my comments have been used incorrectly.	The comments quoted were in response to East Anglia ONE, the format of this Table has been updated to ensure this is clear.
Verizon	10/06/2014	I note in Table 18.2 you make reference to relevant ICPC Recommendations, but…you only appear to reference an earlier (2010) Guideline document.	The reference has been updated to capture the most recent guidance (see section 18.4.1)
Galloper Offshore Wind	08/07/2014	There is insufficient detail in the PEIR with regard the cable crossings for GWFL to be able to offer an informed technical comment on the EA3 proposals.	Further design work has been undertaken since the PEIR and more comprehensive information on a generic cable crossings is now provided in section 5.5.14.5 in Chapter 5 Description of the Development. However, detailed information to enable a cable crossing agreement to be finalised will only be available pre-construction.
Galloper Offshore Wind	08/07/2014	To ensure mitigation is in place GWFL expects that a formal cable crossing	East Anglia THREE Limited (EATL) will continue to consult with Galloper

Consultee	Date /Document	Comment	Response / where addressed in this ES
		agreement between GWFL and EA3 Ltd will be in place in advance of the EA3 DCO application being submitted. The basis for any agreement between GWFL and EA3 Ltd must be that the EA3 project does not put the GWF project at a disadvantage compared to if the EA3 project was not taking place.	Offshore Wind to develop a cable crossing agreement (see Section 18.3.3). Furthermore, EATL would design their cable layout to cross existing cables as close as practical to a 90˚. This would make the design and installation of cable crossings easier.
Galloper Wind Farm Limited	17/09/2015	GWFL need to be sure that EA3 properly considers the potential impacts on the GWF export cables both on an individual basis and cumulatively with the export cables from EA1 and EA4. A full assessment of these impacts and possible mitigation must be included in the final submission for EA3.	Further design work has been undertaken and more comprehensive information on a generic cable crossings is now provided in section 5.5.14.5 in Chapter 5 Description of the Development. However, detailed information to enable a cable crossing agreement to be finalised will only be available pre-construction.
Informal consultation			
Galloper Offshore Wind	02/08/2013	Could be up to 12 crossings between East Anglia THREE and Galloper. Cumulatively there may be a large number of crossings between East Anglia ONE and THREE, and Galloper and Greater Gabbard offshore wind farms, as well as any future projects within the East Anglia zone.	The impacts of a large number of cable crossings to physical processes and benthic ecology are assessed in Chapters 7 and 10 respectively. The cumulative impacts for windfarm operators are assessed in section 18.6.
Relevant consultation from East Anglia ONE.			
Verizon	Relevant representations for East Anglia ONE 29/01/2013	Verizon is the owner of the Ulysses 2 submarine telecommunications cable identified in the East Anglia ONE Environmental Statement, EAOW have continuously consulted with	The East Anglia THREE offshore export cables and interconnector cables would cross the Ulysses 2 cable and therefore a cable crossing agreement will be put in place with Verizon

Consultee	Date /Document	Comment	Response / where addressed in this ES
		us during the pre-planning stage and although the East Anglia ONE development. (Neither East Anglia ONE windfarm or export cable(s)) is planned to cross our asset. As such, no crossing agreement is required with East Anglia ONE.)	post-consent. To make the crossings easier, EATL would design their cable layout to cross existing cables as close as practical to a 90˚
Planning Inspectorate	Rule 8 letter 4/7/2013	Has a cable crossing agreement been reached between the applicant and Galloper Wind Farm Limited? If not, what are the obstacles to agreement?	Cable Crossing agreements are being progressed with Galloper Wind Farm Ltd. However these cannot be finalised until further detailed engineering work has been completed at each individual cable crossing location. This would be completed during the preconstruction stage of the project.
Royal Yachting Association (RYA)	Relevant representations 25/01/2013	We would object to any 50m safety zone that creates a criminal offence and excludes all craft irrespective of their type and activity.	The appropriateness of 50m exclusion zones is assessed in the Navigational Risk Assessment (*Appendix 15.1*).
RYA	Relevant representations 25/01/2013	There is insufficient detail given on the offshore export cable landfall at Bawdsey and its onshore route to Bramford across the Deben and Martlesham Creek.	Greater detail on such matters has been included in Chapter 5 Description of the Development.
Greater Gabbard Offshore Wind Limited (GGOWL)	Relevant representations 5/03/2013	Greater Gabbard has been in operation since September 2011…The East Anglia ONE cable corridor crosses the existing Greater Gabbard export cables. It is also possible that construction and operational transit routes may cross or overlap GGOWL's existing	The proposed East Anglia THREE project export cable will also cross the Greater Gabbard cables. Therefore EATL is engaging with Green Energy Transmissions Limited as the owner of the Greater Gabbard offshore transmission assets to reach a cable crossing agreement (see section

Consultee	Date /Document	Comment	Response / where addressed in this ES
		operational routes. In principal GGOWL is supportive of the East Anglia ONE application… Notwithstanding this, particular areas where GGOWL consider we may wish to make representations on this specific scheme are in relation to construction works, with particular reference to cable crossings and vessel movements.	18.3.1 below).
The Royal Netherlands Yachting Union	Relevant representations 5/03/2013	The Royal Netherlands Yachting Union, as representative of our Dutch yacht racing and cruising members, has interest in the safe navigation in and around Offshore Renewable Energy Installations. Because our members often have ports at the East Anglian coast as destination, we consider ourselves as stakeholder for the development of the East Anglia Offshore Windfarm, and would like to be registered as such.	This will also be relevant to East Anglia THREE and any comments that Royal Netherlands Yachting Union have on this ES consultation will be taken into account.

18.2.1 Cable and pipeline crossing agreements

7. The construction of the proposed East Anglia THREE project would involve the installation of sub-sea cables in proximity to existing active submarine telecommunications and electricity transmission cables and a high pressure gas pipeline which would require cable crossing / proximity agreements. As part of the DCO application to the Planning Inspectorate, and in line with the NPS requirements, EATL has and will continue to consult with the relevant infrastructure owners/operators which may be affected by the project and seek to develop specific crossing agreements, which would be finalised pre-construction when detailed engineering designs are developed with cable installation contractors. Consultation has been undertaken with the relevant operators, as detailed in *Table 18.1*, any

relevant consultation responses from the East Anglia ONE project have been included.

18.3 Scope

18.3.1 Study Area

8. Those marine activities that have the potential to overlap, be influenced by or influence the proposed East Anglia THREE project have been identified where possible. For the majority of cases, this comprises activity within the Outer Thames Estuary and surrounding waters of the southern North Sea.

18.3.2 Worst Case

9. EATL is considering constructing the project in either a Single Phase or in a Two Phased approach. Indicative programmes for both Single Phase and Two Phased approaches are shown in *Tables 5.34* and *5.37* of Chapter 5 Description of the Development. Of particular relevance to this chapter is that the offshore components of the single phase construction would last for 41 months and the offshore components of a Two Phased construction approach would last for 45 months, 42 of which would include offshore working (due to an overlap between the two construction phases under this approach).

10. In relation to infrastructure and other users, the worst case project parameters are those that have the greatest potential impact upon other infrastructure and other users of the sea during construction, operation and decommissioning. Worst case parameters have taken into account the differences between a Single Phase and Two Phased construction programme and are outlined in *Table 18.2.*

Table 18.2 Worst Case Assumptions

Impact	Key design parameters forming the realistic worst case scenario	Rationale
Construction		
Impact 1: Impacts on other UK windfarms	East Anglia THREE site boundary	Wind turbines would be installed within the site boundary at as yet undefined locations; therefore the worst case scenario uses the entire area of the site which is approximately 305km².
	Up to four offshore export cables	The maximum number of offshore export cables for proposed East Anglia THREE project (therefore creating the maximum number of potential cable crossings) is four.
	Programme	The Single Phase offshore construction programme is 41 months in total whilst the phased approach is 45 months (42 of which would involve offshore works).
Impact 2: Increased burial of existing cables and pipelines	Up to four offshore export cables	The maximum number of offshore export cables for the proposed East Anglia THREE project is four.
	Up to four interconnector cables	There would be a maximum of 4 interconnector cables between the proposed East Anglia THREE project and the East Anglia ONE project.
	Cable installation by jetting	The worst case project parameters are those that have the greatest potential impact upon physical processes. See construction impact 5 (section 7.6.1.5) in Chapter 7 Marine Geology Oceanography and Physical Processes.
	Programme	The Two Phased approach could require the installation of an additional offshore electrical platform and three additional link cables.
Impact 3: Interference and damage to sub-sea cables and pipelines	Up to four offshore export cables Up to four interconnector cables	Potential for damage caused to existing cables by the proposed East Anglia THREE project construction activities.

Impact	Key design parameters forming the realistic worst case scenario	Rationale
Impact 4: Disruption to aggregate extraction activity	East Anglia THREE site boundary Offshore cable corridor	Wind turbines would be located within the site boundary at as yet undefined locations; therefore the worst case scenario uses the entire East Anglia THREE site area which is approximately 305km². At present it is not known where within the export cable corridor and interconnector cable corridor the export or interconnector cables would be located. Therefore, in order to cover all potential scenarios it is assumed that up to four export cables could be located anywhere within the export cable corridor which covers an area of approximately 454km^2 and up to four interconnector cables may be placed anywhere within the interconnector cable corridor which covers an area of approximately 454km².
Impact 5: Disruption to oil and gas activity	As above (construction impact 1)	As above (construction impact 1)
Impact 6: Disruption to Ministry of Defence Activities	As above (construction impact 1)	As above (construction impact 1)
Impact 7: Disruption of unexploded ordnance	Footprint of infrastructure	The greater the footprint of the proposed East Anglia THREE project the greater the chance of disturbing UXO. Pre-construction surveys which would focus on magnetic anomalies already identified would greatly reduce the chances of any disturbance by allowing the careful micro-routing of the cable to avoid UXO and other localised hazards
Operation		
Impact 1: Effects on other UK windfarms	East Anglia THREE site boundary Up to four offshore export cables	Wind turbines would be located within the site boundary at, as yet, undefined, locations, therefore the worst case scenario uses the entire area of the site which is 305km². The maximum number offshore export cables for proposed East Anglia THREE project (therefore creating the maximum number of potential cable crossings) is

Impact	Key design parameters forming the realistic worst case scenario	Rationale
	Up to four interconnector cables	four. There would be up to four interconnector cables between the proposed East Anglia THREE project and the East Anglia ONE site which would result in the maximum number of cable crossings.
Impact 2: Impacts upon burial of existing cables and pipelines	Up to four offshore export cables. Up to four interconnector cables	The maximum number of offshore export cables (and therefore creating the maximum number of potential cable crossings) for the proposed East Anglia THREE project is four. There would be up to four interconnector cables between East Anglia ONE and the proposed East Anglia THREE project which would be create the maximum number of cable crossings.
Impact 3 Interference and damage to sub-sea cables and pipelines	Maximum possible number of cable crossings	The worst case scenario is that existing cables would be damaged by the installation of the East Anglia THREE export and interconnector cables
Impact 4: Disruption to aggregate extraction activity	Maintenance vessels transiting to and from site	The majority of maintenance activity would be within the East Anglia THREE site and would be routed away from any dredging activity.
Impact 5: Disruption to oil and gas activity	As above (operation impact 1)	As above (operation impact 1)
Impact 6: Disruption to Ministry of Defence Activities	As above (operation impact 1)	As above (operation impact 1)
Impact 7: Disruption of unexploded ordnance	Maintenance activity	Any maintenance activity which would make contact with the seabed.

Impact	Key design parameters forming the realistic worst case scenario	Rationale
Decommissioning		
Impact 1: Interference and damage to sub-sea cables and pipelines	Up to four offshore export cables Up to four interconnector Cables	The worst case scenario is that sub-sea cables would be damaged during the removal of East Anglia THREE export cables.
Impact 2: Disruption of unexploded ordnance	Any activity employed during decommissioning which would make contact with the seabed	The maximum footprint of decommissioning activity will have the greatest chance of disturbing UXO, however given that the preconstruction survey would have identified any UXO in the vicinity of the windfarm infrastructure the chance of disturbing UXO at decommissioning is very small.

18.3.3 Embedded Mitigation

11. The location of the East Anglia THREE site and offshore cable corridor has been selected to minimise potential interaction with neighbouring infrastructure. As outlined below the project is:

- Located outside any existing active oil and gas wells;
- Located outside any areas licensed for dredging and aggregate extraction;
- Located outside any known MOD danger areas; and
- Located outside any known military practice and exercise areas (PEXA).

12. The East Anglia THREE site has been located to avoid existing pipelines, telecommunication and transmission cables. The East Anglia THREE offshore export and interconnector cables would be aligned so that where there are crossings with other cables and pipelines as near as practicable to a 90^{o} angle.

13. Owners and operators of other infrastructure (including oil and gas developers, dredging companies and electrical and telecommunication cable operators) are, and will continue to be, consulted by EATL and commercial and technical agreements would be put in place where required. Cable crossing agreements would be agreed post-consent during the outline design period and would consider:

- Location of any cable crossing;
- Separation distances
- Materials used for protecting the crossing;
- Method of installation; and
- Methods for maintenance.

14. In terms of reducing the risk and threat of UXO the following embedded mitigation would be implemented:

- An Enhanced Risk Assessment would be required to ascertain the requirements for geophysical survey coverage of site investigation at specific locations (mainly those where infrastructure would be sited) within the East Anglia THREE site and offshore cable corridor due to the large variety of threat items that may be present across these areas. This would draw on guidance such as that provided by BACTEC International Limited (2015) and would

provide an analysis of the contacts at the location and a sign-off certificate would be provided to the contractor to determine that the risks associated with site investigation are reduced to As Low As Reasonably Practicable (ALARP).

- Upon detailed review of geophysical data (including side scan sonar and a detailed magnetometer survey) and other available data, where necessary recovery operations using Remotely Operated Vehicles (ROV) would be considered prior to construction to confirm details of any suspected UXO.
- Should the presence of UXOs be suspected a UXO operational plan would be implemented. The plan would include the nomination of an experienced crew member to be trained as a UXO co-ordinator, enabling them to recognise potential UXO and equipping them with the knowledge on how to react following the discovery of a UXO.
- Crew level munition safety and awareness briefings within the inductions and toolbox talks.
- Munition recognition posters for use on-board all vessels.
- Where necessary micro-siting of infrastructure to avoid potential UXO based on further detailed investigation.

18.4 Assessment Methodology

18.4.1 Guidance

15. As previously mentioned, this chapter has taken into account guidance from the NPS statements. Although specific guidance for all the individual activities assessed in this Chapter is not provided in EN-3, the need to consider other offshore infrastructure is highlighted within the first sections of Chapter 6 – offshore wind. Under "Factors Influencing Site Selection and Design by Applicant" (Page 30) Paragraph 2.6.35 states that:

    "*there may be constraints imposed on the siting or design of offshore wind farms because of restrictions resulting from the presence of other offshore infrastructure or activities*"

16. See Chapter 4 Site Selection and Alternatives for an explanation of the rationale as to the location of the proposed East Anglia THREE project.

17. In addition, the section which describes the impacts of offshore wind on oil, gas and other offshore infrastructure and activities (page 55) provides generic requirements which are applicable to this assessment. Paragraph 2.6.179 states that:

"*where a potential offshore wind farm is proposed close to existing operational offshore infrastructure, or has the potential to affect activities for which a licence has been issued by Government, the applicant should undertake an assessment of the potential effect of the proposed development on such existing or permitted infrastructure or activities. The assessment should be undertaken for all stages of the lifespan of the proposed wind farm in accordance with the appropriate policy for offshore wind farm EIAs"*.

18. Paragraph 2.6.180 states that:

"*applicants should engage with interested parties in the potentially affected offshore sectors early in the development phase of the proposed offshore wind farm, with an aim to resolve as many issues as possible prior to the submission of an application to the IPC*" (now the Planning Inspectorate).

19. In addition to the NPSs there are recommendations provided by the International Cable Protection Committee (ICPC) that are of relevance to this Chapter, as detailed in *Table 18.3*. These are considered separately throughout the chapter.

Table 18.3 Recommendations of the ICPC

Title	Detail
ICPC Recommendation No. 13. Proximity of Wind Farm Developments & Submarine Cables	**Section 2 Consultation**: "*Owners of wind farms and those planning construction are strongly advised to contact the submarine cable owners during the initial planning stage for information on existing and planned submarine cables*".
ICPC Recommendation No.13. Proximity of Wind Farm Developments & Submarine Cables	**Section 4 Separation recommendations**: this section outlines a method for determining separation distances between wind turbines and existing cables. It also states that "*Precise separation distances should be agreed and documented between the parties during the planning process. It is also recommended that wind farm developers consult the following ICPC Recommendation No.7: Procedure To Be Followed Whilst Offshore Civil Engineering Work Is Undertaken In The Vicinity Of Active Submarine Cable Systems*"

Title	Detail
ICPC Recommendation No. 5. Standardisation Of Cable Awareness Charts	**Section 2.6.6 Safe Working Distance or Cable Buffer Zone**" *- Members may wish to designate a "safe working distance" on either side of the cable corridor. Such a zone indicates the recommended distance sea bed users who conduct activity likely to cause damage to a submarine telephone cable shall keep from the cable.*
ICPC Recommendation No. 2 Recommended Routing and Reporting Criteria for Cables in Proximity to Others	Provides generalised cable routing and notification criteria that the ICPC recommend be used when undertaking cable route planning activities where the cable to be installed crosses, approaches close to or parallels an existing or planned system.
ICPC Recommendation No. 3 Criteria to be Applied to Proposed Crossings Between Submarine Telecommunications Cables and Pipelines/Power Cables	Describes the basic considerations required and lists issues that should be addressed when pipeline/power cables cross telecommunications.

20. A number of other specific guidance documents have also been taken into account when completing this assessment. These include:

- Department of Energy and Climate Change (DECC) - The 28th Round general guidance (DECC 2014).
- DECC- The 27th Round Other Regulatory Issues (DECC 2012).
- DECC - The 26th Round Other Regulatory Issues – Version 2 (DECC 2011).
- Department for Communities and Local Government (DCLG) National and Regional Guidelines for Aggregate Provision in England 2005 – 2020, (DCLG 2009).
- Health and Safety Executive (HSE) Offshore Technology Report: Noise and Vibration OTO 2001/068 (HSE 2001).
- International Council for the Exploration of the Sea (ICES) Guidance for the Management of Marine Sediment Extraction (ICES 2003).
- Maritime and Coastguard Agency (MCA) Marine Guidance Note 371: Guidance on UK Navigational Practice, Safety and Emergency Response Issues (MCA 2008).

- Oil and Gas UK, OP024 - Pipeline Crossing Agreement - Edition 2 and Proximity Agreement - Edition 1 (Oil & Gas UK 2008).
- Subsea Cables UK (formerly the UK Cable Protection Committee (UKCPC)): 'Guideline 6 for Proximity of Wind Farm developments and offshore cables' (UKCPC 2012).
- The Royal Yachting Association's (RYA) Position on Offshore Renewable Energy Developments: Paper 1 (of 3) – Wind Energy, May 2012 (RYA 2012);
- The Crown Estate Position Paper: Round 3 Offshore Wind and Oil & Gas – A Critical Interface (The Crown Estate 2010).
- The Crown Estate Submarine cables and offshore renewable energy installations Proximity study (The Crown Estate 2012)

21. Data sources used within the chapter are displayed in *Table 18.4*

Table 18.4 Data Sources

Data Set	Year	Coverage	Confidence	Source
Historic Munitions dump sites	2011	UK	High	OSPAR data
Offshore Cables	2015	UK	High	KisOrca and Global Marine Systems
Windfarms	2015	UK	High	4C offshore
Oil and gas infrastructure	2015	UK	High	Common Data Access Limited (CDAL)
Aggregate sites	2014	UK	High	The Crown Estate
Disposal sites	2014	UK	High	Cefas
PEXA areas	2012	UK	High	SeaZone

18.4.2 Impact Assessment Methodology

22. The generic assessment methodology employed throughout the ES is explained in detail in Chapter 6 EIA Methodology.

23. The assessment of impacts to Infrastructure and other users has focused on establishing potential for overlaps and, therefore, conflict between activities in both a geographical and temporal context. This information has been obtained through

statements made within publicly available literature relating to the activity under question (such as an ES or Scoping Report) or through consultation with the relevant operator of the activity as discussed in section 18.2.

18.4.2.1 Sensitivity

24. The sensitivity of the receptor for each impact is characterised as one of four levels, high, medium, low or negligible. Examples of definitions for differing levels of sensitivity of infrastructure and other users are provided below in *Table 18.5.*

Table 18.5 Definitions of the Different Sensitivity Levels for Infrastructure and Other User Activities

Sensitivity	Definition
High	High sensitivity and limited potential for substitution.
Medium	High or medium sensitivity with limited potential for substitution
Low	Low or medium sensitivity at a local scale
Negligible	Very low sensitivity even at a local scale

18.4.2.2 Magnitude

25. The magnitude of effect has been considered in terms of the spatial extent, duration and timing of the effect in question. Four levels of magnitude (high, medium, low and negligible) are considered with example definitions for a generic receptor provided in *Table 18.6.*

Table 18.6 Definitions of the Magnitude Levels for a Generic Receptor

Magnitude	Definition
High	Loss of resource and / or quality and integrity of resource; severe damage to key characteristics, features or elements
Medium	Loss of resource, but not adversely affecting integrity of resource; partial loss of / damage to key characteristics, features or elements
Low	Some measureable change in attributes, quality or vulnerability, minor loss or, or alteration to, one (maybe more) key characteristics, features or elements
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements
No change	No change from the baseline or existing environment.

18.4.2.3 Impact Significance

26. Following the identification of receptor value and sensitivity and magnitude of the effect, it is possible to determine the significance of the impact, as shown in the

matrix in *Table 18.7*. This matrix is used as a framework to aid understanding of how a judgement has been reached from the narrative of each impact assessment and it is not a prescriptive formulaic method.

27. For each of the impacts identified in section 18.7 criteria, including sources and justifications, for quantifying the different levels of impact are provided. Where possible, this is based upon quantitative and accepted criteria, together with the use of value judgement and expert interpretation to establish to what extent an impact is significant.

Table 18.7 Impact Significance Matrix

Sensitivity	Magnitude				
	High	Medium	Low	Negligible	No change
High	Major	Major	Moderate	Minor	No impact
Medium	Major	Moderate	Minor	Negligible	No impact
Low	Moderate	Minor	Minor	Negligible	No impact
Negligible	Minor	Negligible	Negligible	Negligible	No impact

28. The matrix (and indeed the definitions of sensitivity and magnitude) is used as a framework to aid understanding of how a judgement has been reached for each impact assessed in section 18.7. They are not a prescriptive formula, and the narrative of each impact assessment is important.

29. Through use of this matrix, an assessment of the significance of an impact can be made in accordance with the significance definitions in *Table 18.8*.

Table 18.8 Impact Significance Definitions

Impact Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision making process.
Negligible	No discernible change in receptor condition.
No impact	No change, therefore no impact upon receptor.

30. Potential impacts identified as major and moderate impacts are deemed to be significant in terms of the EIA and have been avoided or reduced through mitigation, where possible. Minor impacts become more important when considering potential, cumulative impacts or interactions.

31. Embedded mitigation is discussed in section 18.4.1, and is referred to throughout the impact assessment. The impact assessment takes into account the embedded mitigation before coming to a conclusion on the potential impact to a receptor.

18.4.3 Cumulative Impact Assessment

32. For a general introduction to the methodology used for the Cumulative Impact Assessment for Infrastructure and Other Users, please refer to Chapter 6 EIA Methodology. This chapter will focus on those cumulative impacts that are specific to infrastructure and other users.

33. Cumulative impacts have been assessed through consideration of the extent of influence of changes or effects on Infrastructure and Other Users arising from the proposed East Anglia THREE project and those arising from other projects either already constructed (where applicable) or in the planning process. These include East Anglia ONE particularly with regards to export cables which would require cable crossing of existing transmission and telecommunication cables. Other nearby sea bed activities including marine aggregate extraction and marine disposal are also considered.

18.4.4 Transboundary Impact Assessment

34. Transboundary impacts have been assessed through consideration of the extent of influence of changes or effects and their potential to impact upon Infrastructure and Other Users located within other EU member states.

18.5 Existing Environment

18.5.1 UK Windfarm and Renewable Energy Developments

35. The UK waters of the southern North Sea is an area of significant offshore wind development activity, having been subject to several phases of offshore wind development under The Crown Estates' Round 1, Round 2, Round 1 and 2 extensions and Round 3 developments.

36. The nearest windfarms to the proposed East Anglia THREE project (outside of the East Anglia Zone) are the Round 2 Greater Gabbard Offshore Wind Farm site and the planned Round 2 extension Galloper Wind Farm located approximately 80km and 74km respectively south west of the East Anglia THREE site and 16.2km and 16.0km from the offshore cable corridor (*Figure 18.1* and *Table 18.9*). The 504MW Greater Gabbard Offshore Wind Farm site became operational in 2013. The Galloper Wind Farm will increase this capacity by 340MW. The next closest UK site is E.ON UK Renewables Scroby Sands site located approximately 65km to the west of the East Anglia THREE site and 48km to the north of the closest point of the offshore cable corridor.

37. A summary table of all planned and operational offshore windfarms in UK waters near to the proposed East Anglia THREE project is provided in *Table 18.9*. The consented East Anglia ONE project is 22km south of the proposed East Anglia THREE project, and is owned by ScottishPower Renewables.

Table 18.9 Summary of Planned and Operational Offshore Windfarms in UK waters near to the proposed East Anglia THREE project

Site	Status	Developer	Distance from the proposed East Anglia THREE project (to nearest km)	
			Site	Offshore cable corridor
East Anglia ONE	Consented	East Anglia ONE Ltd	22	0
Scroby Sands	Operational	E.ON UK Renewables	65	48
Galloper	Consented	SSE Renewables and RWE Innogy	74	16

Site	Status	Developer	Distance from the proposed East Anglia THREE project (to nearest km)	
			Site	Offshore cable corridor
Greater Gabbard	Operational	SSE Renewables and RWE Innogy	80	16
Hornsea 1	Consented	DONG Energy	96	124
Dudgeon	Consented	Statoil and Statkraft	103	102
Sheringham Shoal	Operational	Scira Offshore Energy Ltd	111	103
London Array	Operational	DONG Energy, E.ON UK Renewables, Masdar	116	29
Gunfleet Sands 2	Operational	DONG Energy	133	26
Gunfleet Sands 1	Operational	DONG Energy	135	27
Race Bank	Consented	DONG Energy	136	134
Triton Knoll	Consented	RWE Innogy	137	136
Thanet	Operational	Vattenfall	141	56
Lincs	Operational	Centrica Renewable Energy	157	139
Lynn and Inner Dowsing	Operational	Centrica Renewable Energy	159	157 (Lynn) 159 (Inner Dowsing)
Kentish Flats	Operational	Vattenfall	163	59
Kentish Flats Extension	Consented	Vattenfall	163	61

18.5.2 European Offshore Windfarm Developments near to East Anglia THREE

38. Within the North Sea, Belgium, Denmark, Germany, the Netherlands and Norway are also developing offshore wind capacity within their territorial waters. *Table 18.10* presents information on the offshore windfarms that are currently operational or in planning in European waters in the vicinity of the proposed East Anglia THREE project.

39. The closest operational development to the East Anglia THREE site is the Princess Amalia windfarm which is approximately 81km south east of the East Anglia THREE site. The Brown Ridge Oost windfarm for which consent has been authorised is the closest planned windfarm and is located approximately 26km to the east of the East Anglia THREE site (*Figure 18.1*). Brown Ridge Oost is within the Ljmuiden Development Zone which represents an area in which further windfarm

development may be proposed. The boundary of the Ljmuiden Development Zone is located approximately 16km from the East Anglia THREE site.

Table 18.10 Summary of Planned and Operational Offshore Windfarms outside of UK Waters near the East Anglia THREE site.

Site	Status	Developer	Distance from the East Anglia THREE site(to nearest km)
Brown Ridge Oost	Consent Authorised	Eneco	26
Tromp Binnen	Consent Authorised	RWE	28
Breeveertien II	Consent Authorised	DONG Energy	40
Den HelderI	Consent Authorised	DONG Energy	41
Helmveld	Consent application submitted	Envelop (Eneco)	68
West Rijn	Consent Authorised	DONG Energy	60
Beaufort	Consent Authorised	Nuon (Vattenfall AB)	75
Princess Amalia	Operational	Eneco	81
Eneco Luchterduinen	Consent Authorised	Eneco	85
2018 Tender	Concept/Early Planning	Ministerie van Economische Zaken	85
THV Mermaid	Concept/Early Planning	THV Mermaid	85
North Wester II	Concept/Early Planning	Colruyt	90
Belwind Phase II	Consent Authorised	Belwind NV	88
Belwind I (Bligh Bank)	Operational	Belwind	89
Egmond an Zee (OWEZ)	Operational	NordzeeWind	90
Seastar	Consent Authorised	Seastar NV	94
Northwind NV	Under Construction	Northwind NV (formally Eldepasco)	96
Rental	Consent Authorised	Rental NV	99
Thornton Bank I	Operational	C-Power	103
Thornton Bank Phase II	Operational	C-Power	104

40. *Table 18.10* and *Figure 18.1* only display windfarm projects where there is certainty over the intention to submit an application for development. Development areas, “concept / early planning”, “dormant” projects and cancelled projects are not displayed as it is not possible to assess the impacts of these.

18.5.3 Oil and Gas Pipelines and Platforms

41. Historically, there have been three oil and gas platforms situated in the northern part of the East Anglia Zone, one of which has recently been decommissioned and removed. These three platforms along with their proximity to the proposed East Anglia THREE project are presented in *Table 18.11*.

Table 18.11 Oil or Gas Platforms near the proposed East Anglia THREE project

Platform	Description	Distance from East Anglia THREE (to nearest km)	
		Site	Offshore cable corridor
Horne & Wren - Unmanned Tullow platform	Active	20	20
Welland Field - ExxonMobil platform	Decommissioned and removed in February 2011	26	26
Davy Field - Unmanned Perenco platform	Ceased production but not decommissioned	27	29

42. In the north of the East Anglia Zone, there are 96 oil and gas wells, the majority of which are plugged and abandoned, and none are located within the East Anglia THREE site (*Figure 18.2*). All of these wells were exploratory wells which were found to be dry, however licences have been awarded for future exploration of the area (see section 18.5.4). EATL have been in consultation with ENI who hold the licences for four licence blocks which overlap the proposed East Anglia THREE project (*Figure 18.2*) ENI have informed EATL that it has identified sites within the East Anglia THREE site which may be explored in future but their current focus is for a site located outside of the East Anglia THREE site.

43. Any significant additional infrastructure including operational platforms, wells and pipelines, are located just outside the northern boundary of the East Anglia Zone.

44. Two gas pipelines cross the East Anglia Zone, the BBL Balgzand- Bacton gas pipeline running east-west 12km north of the East Anglia THREE site, and the Bacton – Zeebrugge gas interconnector running northwest to southeast which passes through the export cable corridor (*Figure 18.2* and *Table 18.12*). An additional five pipelines run from Bacton to the platforms and wells in the northern area of the East Anglia Zone, three for the previously mentioned gas wells, and two for oil wells. Additional pipelines also exist to the immediate north of the East Anglia Zone associated with the concentration of oil and gas activity in this region.

45. There is regular helicopter traffic that transports crew between North Sea oil and gas platforms and the mainland. Some of this traffic currently travels through the East Anglia Zone as discussed in Chapter 16 Aviation and MOD, however very little of this is through the East Anglia THREE site. There is also shipping traffic associated with oil and gas infrastructure that occurs in the Zone, as discussed in Chapter 15 Shipping and Navigation.

18.5.4 Oil and Gas Licence Areas

46. For the purpose of oil and gas licensing, the UK continental shelf (UKCS) is divided into quadrants and blocks. Different types of licence for particular blocks, or part blocks, are issued by DECC through competitive annual Seaward Licensing Rounds under the Petroleum Act 1998 (as amended).

47. There are a number of different licences within and in close proximity to the East Anglia THREE site and the offshore cable corridor. These are shown in *Figure 18.2* along with licence blocks available under the 28th round.

48. Currently the following awarded licenced blocks overlap with the East Anglia THREE site: 53/14a, 53/15 and 54/6a, and block 53/20a overlaps with the offshore cable corridor (*Figure 18.2*). All of these blocks are currently licenced to ENI who propose to drill one exploratory well within the East Anglia THREE site and two wells in close proximity to the East Anglia THREE site.

18.5.5 Sub-sea Cables

49. The southern North Sea has a significant number of sub-sea cables; primarily telecommunication connections between the UK and continental Europe, none of which cross the East Anglia THREE site (*Figure 18.2*).

50. One operational telecommunications cable crosses the offshore cable corridor at an approximate north-south trajectory indicating that there would be an interaction between the offshore cable corridor and cables already on the seabed (*Figure 18.2*). EATL will be submitting an application for the installation of up to four export cables and therefore four individual crossings could be required.

51. The routes of the three Greater Gabbard Offshore Wind Farm offshore export cables and the three proposed Galloper offshore windfarm export cables would cross the East Anglia THREE export cable corridor from north to south (*Figure 18.2*). This would require up to 24 cable crossings assuming a worst case of four East Anglia THREE offshore export cables installed within the export cable corridor (See Chapter 5 Description of the Development for further details).

52. In addition, there are likely to be disused cables that date from over 100 years ago, many of which are now lost or not shown on charts, and represent a risk to seabed activity. Modern charts only display cables decommissioned since 1987.

53. *Table 18.12* presents all known sub-sea cables and gas pipelines that pass through the East Anglia THREE offshore cable corridor.

Table 18.12 Summary of operational offshore oil and gas pipelines and offshore cables which intersect the East Anglia THREE offshore cable corridor (as shown in *Figure 18.2*).

Asset Name	Asset type	Operator	General Trajectory (approximate)	No. of Export Crossings Anticipated	No. of Interconnector Crossings Anticipated
Lowestoft-Norderney	Telecommunications cable	Out of service	East to west	4	4
Lowestoft-Borkum 2	Telecommunications cable	Out of service	East to west	4	4
UK-Netherlands 10	Telecommunications cable	Out of service	East to west	4	4
Pangea South	Telecommunications cable	ASN	East to west	4	4
Circe North	Telecommunications cable	VIATEL	East to west	4	4
Rembrandt 1	Telecommunications cable	Out of service	East to west	Not applicable	Not applicable
Atlantic Crossing 1	Telecommunications cable	Level 3 Communications	East to west and then North to south	8	4
Ulysses 2	Telecommunications cable	Verizon	East to west	4	4
Lowestoft-Scheveningen No2	Telecommunications cable	Out of service	East to west	4	4
Lowestoft-Zandvoort	Telecommunications cable	Out of service	East to west	4	4
Benacre-Zandvoort No1	Telecommunications cable	Out of service	East to west	4	4
Covehithe-Katwijk No2	Telecommunications cable	Out of service	East to west	4	4
Bacton / Zeebruge Interconnector	Gas Pipeline	Interconnector (UK)	North to south	4	Not applicable
Hermes North	Telecommunications cable	Out of service	East-west	Not applicable	4
Benacre-Zandvoort No2	Telecommunications cable	Out of service	East to west	4	4

Asset Name	Asset type	Operator	General Trajectory (approximate)	No. of Export Crossings Anticipated	No. of Interconnector Crossings Anticipated
Concerto 1 North	Telecommunications cable	Interoute	East to west	4	0
Concerto 1 South	Telecommunications cable	Interoute	North to South	4	Not applicable
Greater Gabbard	Three Transmission Cables	Green Energy Transmissions Limited	North to south	Up to 12	Not applicable
Galloper (consented, but yet to be installed)	Transmission Cables (Up to THREE)	Galloper Wind Farm Limited	North to south	Up to 12	Not applicable
Netherlands 5	Telecommunications cable	Out Of Service	East to west	Not applicable	Not applicable
Farland North	Telecommunications cable	BT	East to west	4	Not applicable

54. Crossing agreements would be finalised prior to construction commencing with the owners of pipelines and cables. The agreements would include conditions for the design of these crossings to ensure that there is no impact upon the operation of existing infrastructure.

55. Shipping traffic associated with sub-sea cables is discussed in Chapter 15 Shipping and Navigation.

18.5.6 Marine Aggregate Dredging

56. No aggregate dredging areas exist within the proposed East Anglia THREE project boundaries (*Figure 18.3*). The closest dredging area is licence area 430 which is located 926m to the north of the export cable corridor and is operated jointly by Cemex and Tarmac Marine Dredging. Historically area 496 (Ben Acre) was dredged however this was surrendered in February 2013.

57. Located approximately 607m to the south of the export cable corridor at its western end is Aggregates option area 446 (*Figure 18.3*). Hanson, Cemex and Lafarge Tarmac Marine currently hold a licence to dredge this area, however it is not active.

58. Shipping traffic associated with marine aggregate dredging is discussed in Chapter 15 Shipping and Navigation.

18.5.7 Disposal Sites

59. The proposed East Anglia THREE project has no overlap with disposal sites currently in use. The export cable corridor and interconnector cable corridor both intersect a disused disposal site (TH075, see *Figure 18.3*). As this site is not in use there is no pathway for potential impacts and therefore disposal sites are not considered further in this assessment. For consideration of potential impacts with water quality see Chapter 8 Water and Sediment Quality.

18.5.8 Ministry of Defence Activities

60. No naval activities are known to be undertaken within the East Anglia Zone. However, PEXA do exist outside to the south and south west of the East Anglia Zone, with the North Galloper PEXA situated approximately 16km south of the East Anglia THREE export cable corridor (*Figure 18.4*). PEXA sites themselves can refer to any area used for practice by UK armed forces.

18.5.9 Unexploded Ordnance

61. The area surrounding the proposed East Anglia THREE project was important during both World Wars due to its proximity to the ports of Felixstowe, Harwich, Lowestoft and Great Yarmouth. This means there is high potential for munitions related to

wrecks in the vicinity of the proposed East Anglia THREE project containing UXO items.

62. A munitions dump site has been identified in the northern section of the East Anglia THREE site. This is listed in an OSPAR report that gives an overview of past dumping at sea of chemical weapons and munitions in the OSPAR Maritime Area (OSPAR 2010). A data set associated with this report is displayed in *Figure 18.3* as site number 31 which is a "conventional munitions" dump site which was designated for surplus munitions disposal.

63. Consultation with OSPAR has suggested that conventional weapons that are expected to have been disposed on site would include (but is not limited to) bombs, grenades, torpedoes and mines. There is no information available on the quantity of munitions that may be present onsite due to records of disposal often being informal or incomplete.

64. A second munitions dump site is located just to the south of the export cable corridor (*Figure 18.3*).

65. As detailed in section 18.3.3 an appropriate UXO survey would be carried out where necessary prior to any construction work commencing which would identify any UXO still located within the East Anglia THREE site and the offshore cable corridor.

18.6 Potential Impacts

18.6.1 Potential Impacts during Construction

18.6.1.1 Impact 1: Impacts on other UK Windfarms

66. Impacts on other windfarms during construction of the proposed East Anglia THREE project could arise from the following:

- Overlap of construction activities;
- Increased pressure on port facilities;
- Navigational safety issues; and
- Aviation (i.e. helicopter) safety issues.

67. Issues arising from navigational safety and aviation are dealt with in Chapter 15 Shipping and Navigation and Chapter 16 Aviation and MOD, respectively.

68. East Anglia ONE is the closest offshore windfarm project to the proposed East Anglia THREE project (*Figure 18.1*). EAOW have taken a strategic approach to developing

the East Anglia Zone and impacts to other offshore windfarms within the zone are therefore not expected. This has involved the production of a Zonal Technical Appraisal and a Zonal Environmental Appraisal which were produced prior to the location of any sites within the Zone, details of this process are provided in section 4.3 of Chapter 4 Site Selection and Alternatives.

69. There are three other UK offshore windfarm projects located within the vicinity of the proposed East Anglia THREE project; Scroby Sands, Galloper and Greater Gabbard Offshore Wind Farm (*Figure 18.1*). The closest to the East Anglia THREE site is Scroby Sands located approximately 65km to the west. Greater Gabbard Offshore Wind Farm and Galloper are located approximately 16km south from the East Anglia THREE export cable corridor. As Scroby Sands and Greater Gabbard Offshore Wind Farm are operational there would not be an overlap of construction activities therefore there would be no impact upon them.

70. Concerns were raised during the application for consent for East Anglia ONE regarding the overlapping of the cable installation in both space and time for the Galloper Wind Farm and East Anglia ONE Offshore Windfarm. These are presented in the East Anglia ONE EIA (East Anglia ONE Ltd 2012). The East Anglia THREE export cable corridor would join the East Anglia ONE cable route at an as yet undetermined location. Installation of the Galloper Wind Farm offshore export cables is likely to be completed prior to the installation of the East Anglia THREE offshore export cables, as construction is scheduled to begin in late 2015 therefore it is unlikely that there would be temporal overlap of construction.

71. The East Anglia THREE export cables would need to cross both the Greater Gabbard Offshore Wind Farm and Galloper offshore export cables. The likely significance of this is discussed in construction Impact 3 (section 18.6.1.3) below. Interconnector cables would not need to cross either Galloper Wind Farm or Greater Gabbard Offshore Wind Farm project infrastructure.

72. With regard to increased pressure on port facilities, it is not possible at this time to determine pathways for impact as the construction port(s) for the proposed East Anglia THREE project have yet to be determined. Effects would be specific to the port(s) in question. In addition, part of the selection and procurement process for the port(s) chosen for the construction phase of the proposed East Anglia THREE project would take into account capacities and schedules to determine feasibility of their being able to adequately resource the requirements of the proposed East Anglia THREE project.

73. Given the relatively large separation distance between the East Anglia THREE site and the other UK offshore windfarms (*Table 18.9*) as well as the limited spatial and temporal overlap, the sensitivity of the receptor and anticipated magnitude of impact during construction is considered to be negligible, therefore the significance of the impact is anticipated to be **negligible**.

74. There would be no significant difference between the Single Phase or Two Phased programme approaches, given that the construction programmes are similar in overall duration.

18.6.1.2 Impact 2: Increased Burial of Existing Cables and pipelines

75. During construction, there is the possibility of increased burial of existing cables and pipelines from the deposition of suspended sediment created during the installation of foundations and export, interconnector and inter-array cables (see Chapter 7 Marine Geology, Oceanography and Physical Processes).

76. However, the burial depths are not anticipated to be sufficient enough to cause any damage to existing cables and pipelines or to affect maintenance access for their operators. Therefore, sensitivity and magnitude are considered to be negligible, leading to an impact of **negligible** significance.

77. The choice of construction phasing approach would not alter the nature of the impact on cable burial depths and therefore the impact would be of **negligible** significance under both the Single Phase and Two Phased approaches.

18.6.1.3 Impact 3: Interference and Damage to Sub-sea Cables and Pipelines

78. As detailed in sections 18.5.3, 18.5.5 and *Figure 18.2*, the offshore export cable corridor would cross:

- Eighteen telecommunications cables, eleven of which are out of service and one (Atlantic Crossing 1) which would be crossed twice.
- Three electrical transmission cables from Greater Gabbard Offshore Wind Farm, up to three export cables from the Galloper offshore windfarm (yet to be installed); and
- The Bacton to Zeebrugge gas pipeline.

79. In addition, the interconnector cable corridor could also cross fifteen telecommunication cables, ten of which are out of service (*Figure 18.2*).

80. Construction activities, such as offshore export cable, interconnector and inter-array cable installation, vessel anchoring and debris cleaning operations could interfere

with the submarine cables and gas pipeline, which could disrupt telecommunication and energy networks.

81. Damage to offshore cables and pipelines caused during the installation of the East Anglia THREE export cables would be expensive to repair and could cause disruption to power distribution and telecommunications, therefore the sensitivity of the receptor is high. However, cable and pipeline crossing agreements with operators would be put in place as embedded mitigation and reduce the risk of impact (see section 18.3.3) and minimise the magnitude of the impact to negligible.

82. The choice of phasing approach would not alter the number of cable crossings required and would therefore not result in any change to the significance of the impact, therefore the impact would be considered to be of **minor adverse** significance under both the Single Phase and Two Phased approaches.

18.6.1.4 Impact 4: Disruption to Aggregate Extraction Activity

83. There are no aggregate dredging areas within the proposed East Anglia THREE project. The export cable corridor is in close proximity to dredging licence area 430, which is located 926m to the north of the offshore cable corridor (*Figure 18.3*).

84. Aggregates option Area 446 is located 617m to the south of the export cable corridor; however this is currently not dredged. As with other offshore windfarms, "dormant" projects and cancelled projects are not considered as it is not possible to assess impacts to these.

85. There are two aggregate dredging regions licenced by the Crown Estate in the southern North Sea; the East Coast Region and the Outer Thames Region. The offshore cable corridor overlap with both of these areas, however at present these represent much larger areas of search and there are currently no areas that are actively being dredged within the East Anglia THREE offshore cable corridor.

86. Cable installation works would be transient and temporary in nature and are not expected to overlap any aggregate sites. Additionally, no concerns have been raised during consultation by Cemex and Lafarge Tarmac Marine Dredging who operate area 430. Therefore, the only potential impact source would be through possible temporary disturbance to vessel movements and access. Impacts on vessels are discussed in Chapter 15 Shipping and Navigation.

87. Given the fact that there is no overlap and that there is a reasonable distance between the active dredging areas and the proposed East Anglia THREE project, the sensitivity and magnitude of the impact on dredging activity is considered to be negligible. The choice of Single Phase and Two Phased approach would not alter the

significance of the impact on dredging activities, therefore the impact would be of **negligible** significance under both approaches.

18.6.1.5 Impact 5 Disruption to Oil and Gas Activity

88. There are planned and on-going oil and gas operations in licensed blocks overlapping with the East Anglia THREE site and the offshore cable corridor (See section 18.5.4 and Figure 18.2). EATL is continuing to engage with oil and gas developers, mainly ENI UK Limited who currently hold the licence for these blocks. EATL have been in contact with ENI UK Ltd to discuss the relative interests of both the proposed East Anglia THREE project and the oil and gas licenced block. This programme of consultation will be ongoing to discuss any impacts that may arise from the proposed East Anglia THREE project and enable any impacts to be mitigated as far as possible. This will ensure that with necessary planning and engagement, disruption due to construction will be avoided.

89. Impacts to existing oil and gas pipelines are assessed in construction impact 3 (section 18.6.1.3).

90. It is difficult to predict the level of impact that the construction of the proposed East Anglia THREE project would have on future oil and gas activity, however the continued consultation with licensees of the oil and gas licence blocks should ensure that the magnitude of the impact would be low.

91. The oil and gas industry as a receptor is an industry of national importance; however, the integrity of the resource (oil and gas) would not be affected by the proposed East Anglia THREE project.

92. The phasing of the construction has the potential to impact on some oil and gas activity, in particular, any seismic exploration exercises scheduled within adjacent licenced blocks. However, this would be managed through consultation and it is not currently possible to determine which would be the preferred approach from the oil and gas industry's perspective. At present, the impact significance of **minor adverse** would apply to both Single Phase and Two Phased approaches.

18.6.1.6 Impact 6: Disruption to Ministry of Defence Activities

93. No known naval activities exist within the East Anglia Zone, however, the North Galloper PEXA are situated approximately 16km south of the East Anglia THREE site. However, the MOD have not highlighted any concerns with regards to the PEXAs and therefore although these would be highly sensitive receptors given that there is no overlap it is considered that there would be **no impact**. As there is no pathway for

impact there would be no difference for either the Single Phase or Two Phased approaches

18.6.1.7 Impact 7: Disturbance of Unexploded Ordnance

94. There are a high number of vessel wrecks in the vicinity of the proposed East Anglia THREE project which may contain UXO items. The majority of UXO items are likely to be located on the surface of the seabed, or partially buried. Furthermore, data from an OSPAR (OSPAR 2010) report indicates the presence of a munitions dumpsite within the northern part of the East Anglia THREE site. This report identifies that this site has been used to dump conventional munitions, however no further detail is provided in the report. Geophysical surveys (see Chapter 7 Marine Geology, Oceanography and Physical Processes) commissioned by EATL have not found any evidence of this dumpsite, and it is not delineated on Charts 2182a –North Sea Southern Sheet, 1504 – Cromer to Orford Ness or 1503 – Outer Dowsing to Smith's Knoll including Indefatigable Banks.

95. During construction, activities that interact with the sea bed either directly (e.g. jack-up vessel) or via the placement of material such as foundations or cable installation, run the risk of disturbing UXO, with potentially dangerous and damaging effects to both construction workers and equipment.

96. Therefore, given the potential for UXO within the proposed East Anglia THREE project, the impact would be described as a risk, for which a 'medium' risk level is predicted.

97. To reduce the risk of UXO disturbance to ALARP, a number of mitigation measures are proposed within section 18.3.3, including pre-construction surveys (which will consider the munitions dump identified in the OSPAR report) and micro-siting of infrastructure to avoid known occurrences of UXO. Given these embedded mitigation measures the risk of disrupting UXO is considered to be low.

98. There would be some differences between installed infrastructure between the Single Phase and Two Phased approaches, (i.e the Two Phased approach requires one more offshore electrical platform and three additional platform link cables) however, given that these risks would be managed as described above it is not considered that there is any greater risk involved in the Two Phased approach over the Single Phase.

18.6.2 Potential Impacts during Operation

18.6.2.1 Impact 1: Impacts on other UK Windfarms

99. Impacts to other windfarms during operation of the proposed East Anglia THREE project could arise from the following:

- Overlap of maintenance activities;
- Increased pressure on port facilities;
- Navigational safety issues; and
- Aviation (i.e. helicopter) safety issues.

100. Issues arising from navigational safety and aviation are dealt with in Chapter 15 Shipping and Navigation and Chapter 16 Aviation and MOD, respectively.

101. Given the distance between the East Anglia THREE site and nearest offshore windfarm projects (East Anglia ONE, Scroby Sands, Galloper and Greater Gabbard Offshore Wind Farm) there is limited overlap in infrastructure apart from at and in the vicinity of cable crossings. It is therefore considered that there is limited potential for maintenance activity interactions. In addition, any works at cable crossings would be subject to the conditions of the crossing agreements and therefore the potential for impact would be mitigated. The magnitude of impact upon other windfarms during the operation of the proposed East Anglia THREE project is considered negligible, with a high sensitivity of receptor. The impact is therefore considered to be of **minor adverse** significance.

102. With regard to increased pressure on port facilities, it is not possible at this time to determine pathways for impact as the operation and maintenance (O&M) port for the proposed East Anglia THREE project has yet to be determined. Effects would be specific to the port(s) under consideration. In addition, part of the selection and procurement process for the port(s) chosen for O&M of the proposed East Anglia THREE project would take into account capacities and schedules to determine feasibility of their being able to adequately resource the requirements of the proposed project.

18.6.2.2 Impact 2: Impacts upon the Burial of Existing Cables and Pipelines

103. During operation of the proposed East Anglia THREE project, there is the potential for the presence of the foundations and wind turbines to cause changes to the tidal and wave regimes as well as the sediment regime, which may in turn, lead to the burial or exposure of existing cables and pipelines.

104. Chapter 7 Marine Geology, Oceanography and Physical Processes considers these changes in detail and assesses their magnitude. The effects on the tidal regime during operation are expected to be very small and localised. Similarly, effects on the wave and sediment regime during operation are predicted to be localised and low in magnitude.

105. Sensitivity of existing cables and pipelines to burial is considered low and taking into account the findings of Chapter 7 Marine Geology, Oceanography and Physical Processes the magnitude is also considered to be negligible resulting in an impact of **negligible** significance.

18.6.2.3 Impact 3: Interference and Damage to Sub-sea Cables and Pipelines

106. During the operation phase, there is the potential for maintenance activities to interfere with sub-sea cables and pipelines. Maintenance activities may include cable repair work which could entail the use of jack-up vessels and the deployment of anchors. It is expected that any such activity would be subject to the same principles and agreements as established during the construction phase (see construction impact 3, section 18.6.1.3).

107. Due to the potential to interfere with power distribution and telecommunications, the sensitivity of the receptor is high. However, the likelihood of damage to existing cables during such maintenance work is remote and due to the implementation of embedded mitigation through cable crossing agreements, the magnitude of the impact is predicted to be negligible. Therefore, an impact of **minor adverse** significance is predicted.

18.6.2.4 Impact 4: Disruption to Aggregate Extraction Activity

108. No aggregate licence areas are situated within the proposed East Anglia THREE project, therefore it is not anticipated that operational activities associated with the proposed East Anglia THREE project would have any significant impacts on existing extraction activities. Although licence area 430 is in close proximity to the export cable corridor (*Figure 18.2*), vessel activity associated with the operation of the proposed East Anglia THREE project would be significantly reduced in comparison with the construction phase. Therefore, impacts relating to vessel interactions and access are likely to be extremely limited. Based on this information, the sensitivity of the receptor and magnitude of the impact are both considered to be negligible, therefore the impact is predicted to be of **negligible** significance.

18.6.2.5 Impact 5: Disruption to Oil and Gas Activities

109. As discussed in construction impact 5 (section 18.6.1.5) there are planned on-going oil and gas operations in licensed blocks overlapping with the proposed East Anglia

THREE project. EATL would continue to engage with any relevant oil and gas developers during operation of the windfarm. This would ensure that with necessary planning and engagement, disruption due to the operation of the proposed East Anglia THREE project would be avoided.

110. Therefore the magnitude of the impact is predicted to be negligible and although the receptor is considered to be of national importance the integrity of the resource would not be affected and therefore an impact of **negligible** significance is predicted.

18.6.2.6 Impact 6: Disruption to MOD Activities

111. As no known naval activities overlap with the proposed East Anglia THREE project, the project is unlikely to cause any change to the baseline and therefore **no impact** is predicted.

18.6.2.7 Impact 7: Disturbance of Unexploded Ordnance

112. During operation, the number of vessels visiting the site would be significantly reduced from that seen during construction; therefore a **negligible** risk to disturbance of UXO is predicted. The mitigation measures described in the construction phases and in section 18.3.3 would be enforced during routine visits on all operational vessels.

18.6.3 Potential Impacts during Decommissioning

113. During decommissioning, the majority of impacts identified during the construction phase are applicable. There is likely to be an increased level of vessel activity associated with the removal of structures. Similar to the majority of the construction impacts, there is limited source for the potential impact on other human activities given the lack of spatial overlap, where this is the case no impacts are predicted.

18.6.3.1 Impact 1: Interference and Damage to Sub-sea Cables and Pipelines

114. To minimise environmental impacts, the offshore export, interconnector and inter-array cables would be disconnected and left in-situ. Wind turbine and offshore platform foundations would be removed from the East Anglia THREE site, but these would have been located to avoid any impact upon cables and pipelines during construction. Therefore there would be **no impact** upon other cables or pipelines.

18.6.3.2 Impact 2: Disturbance of unexploded ordnance

115. The decommissioning of the proposed East Anglia THREE project would see an increased level of vessel activity (from that experienced during operation) associated with the removal of all structures. Whilst there is a chance of disturbing UXO during decommissioning, it is considered unlikely that any UXO would be affected that had

not previously been dealt with during construction. Mitigation measures detailed for construction impact 7 (section 18.6.1.7) would be considered, reducing the risk. These measures will be set out within a decommissioning plan. With such mitigation in place the residual risk of disturbance to UXO would be **low**.

18.7 Cumulative Impacts

116. The predicted impacts of the proposed East Anglia THREE project to infrastructure and other users are:

- Effects on other UK and European windfarm developments;
- Effects upon the burial of existing cables and pipelines;
- Interference and damage to sub-sea cables and pipelines;
- Disruption of oil and gas activities;
- Disruption to marine aggregate activities; and
- Disturbance of unexploded ordnance.

117. These impacts are expected to be temporary, small scale and localised. Given the distance to other offshore windfarm developments, the localised nature of the development works and the implementation of embedded mitigation, there is no pathway for interaction between impacts cumulatively.

118. Therefore, given that the impacts assessed for the proposed East Anglia THREE project are considered negligible or avoidable through embedded mitigation, it is considered that at a cumulative level, impacts upon infrastructure and other users would be negligible.

18.8 Transboundary Impacts

119. Receptors considered for the transboundary impact assessment are:

- European windfarms;
- Oil and gas; and
- Cable and pipelines.

120. With regard the oil and gas activities there are no direct overlaps of active infrastructure and therefore no potential for transboundary impacts. Impacts upon cables and pipelines which cross international boundaries are covered above (see

sections 18.6.1.2, 18.6.1.3, 18.6.2.2 and 18.6.2.3). There is no pathway for transboundary impacts upon UXO or foreign military operations.

121. Impacts to other European windfarms during construction of the proposed East Anglia THREE project could arise from the following:

- Overlap of construction activities;
- Increased pressure on port facilities;
- Navigational safety issues; and
- Aviation (i.e. helicopter) safety issues.

122. Issues arising from navigational safety and aviation are dealt with in Chapter 15 Shipping and Navigation and Chapter 16 Aviation and MOD, respectively.

123. The East Anglia THREE site is situated adjacent to Dutch territorial waters, where a number of offshore windfarm developments are proposed. The East Anglia THREE site is located near four Dutch offshore windfarms which are planned for development (Tromp Brenan, Den Helder I, Brown Ridge Oost and Breeveertien II), the closest of which, Brown Ridge Oost, is situated 26km from the East Anglia THREE site. All four of the Dutch windfarms have been given consent for development; however, no construction dates for any of these windfarms have been set.

124. Given the separation distance of 26km between East Anglia THREE site and the nearest European windfarm and the lack of spatial overlap between proposed projects, the sensitivity of the receptors and magnitude of effect are predicted to be negligible, therefore the significance of the impact is anticipated to be **negligible**.

125. With regard to increased pressure on port facilities, it is not possible at this time to determine pathways for impact as the construction port(s) for the proposed East Anglia THREE project have yet to be determined. Effects would be specific to the port(s) in question. In addition, part of the selection and procurement process for the port(s) chosen for the construction phase of the proposed East Anglia THREE project will take into account capacities and schedules to determine feasibility of their being able to adequately resource the requirements of the proposed project.

126. During its operation, it is unlikely that East Anglia THREE would impact on windfarms and renewable energy developments in other European countries given that they are all located more than 26km east of the East Anglia THREE site. Therefore, the sensitivity and magnitude of the receptor is predicted to be negligible, and the impact to be of **negligible** significance.

18.9 Inter-relationships

127. *Table 18.15* illustrates the inter-relationship between impacts discussed in this chapter and those discussed in other chapters.

Table 18.15 Chapter topic inter-relationships

Topic and description	Related Chapter	Where addressed in this Chapter
Construction		
Indirect impacts associated with other offshore wind farms during construction.	Influencing parameter: Chapter 15 Shipping and Navigation	18.7.1 and 18.7.2
Indirect impacts on aggregate shipping activities.	Influencing parameter: Chapter 15 Shipping and Navigation	18.7.1 and 18.7.2
Operation		
Impact 5: Disruption to aggregate extraction activity	Influencing parameter: Chapter 15 Shipping and Navigation	18.7.2

18.10 Summary

128. *Table 18.16* summarises the predicted impacts to infrastructure of the proposed East Anglia THREE project through the construction, operation and decommissioning phases.

Table 18.16 Potential Impacts identified for infrastructure and other uses

Potential Impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation	Residual Impact
Construction						
Impacts on other UK windfarms	UK offshore windfarm developments	Negligible	Negligible	Negligible	N/A	Negligible
Increased burial of existing cables and pipelines	Sub-sea cables and pipelines	Negligible	Negligible	Negligible	N/A	Negligible
Interference and damage to sub-sea cables and pipelines	Sub-sea cables and pipelines	High	Negligible	Minor adverse	N/A	Minor adverse
Disruption to aggregate extraction activity	Aggregate dredging companies	Negligible	Negligible	Negligible	N/A	Negligible
Disruption to oil and gas activity	Oil and gas developers	Medium	Negligible	Minor adverse	N/A	Minor adverse
Disruption to Ministry of Defence Activities	Navy and MOD	No pathway	No pathway	No impact	N/A	No impact
Disturbance of unexploded ordnance	Construction workers and equipment			Low risk	See section 18.6.1.8	Low risk
Operation						
Impacts on other UK windfarms	UK offshore windfarm developments	High	Negligible	Minor adverse	N/A	Minor adverse
Impacts upon the burial of existing cables and pipelines	Sub-sea cables and pipelines	Negligible	Negligible	Negligible	N/A	Negligible
Interference and damage to sub-sea cables and pipelines	Sub-sea cables and pipelines	High	Negligible	Minor adverse	N/A	Minor adverse

Potential Impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation	Residual Impact
Construction						
Disruption to aggregate extraction activity	Aggregate dredging companies	Negligible	Negligible	Negligible	N/A	Negligible
Disruption to Oil and gas Activity	Oil and gas developers	Medium	Negligible	Minor Adverse	See section 18.6.2.5	Negligible
Disruption to Ministry of Defence Activities	MOD	Medium	No change	No impact	N/A	No impact
Disturbance of unexploded ordnance	Construction workers and equipment	N/A	N/A	Negligible risk	See section 18.6.2.7	Negligible risk
Decommissioning						
Interference and damage to sub-sea cables and pipelines	Sub-sea cables and pipelines	High	No change	No impact	N/A	No impact
Disturbance of unexploded ordnance	Construction workers and equipment	N/A	N/A	Medium risk	See section 18.7.1.7	Low Risk

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Chapter 18 Ends Here