FOREWIND

DOGGER BANK
TEESSIDE A & B

March
2014

Environmental Statement Chapter 33 Cumulative Impact Assessment

Application Reference: 6.33

Cover photograph: Installation of turbine foundations in the North Sea

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1 Introduction

1.1 Background

1.1.1 This chapter of the Environmental Statement (ES) provides a summary of the cumulative impact assessment (CIA) for Dogger Bank Teesside A & B. It describes the requirement for CIA in general, the guidance for completing CIA in relation to Nationally Significant Infrastructure Projects (NSIP) and the consultation that has been undertaken in order to inform the approach that Forewind has adopted.

1.1.2 The chapter only presents a summary of the results of the CIA, full details of which are presented in the relevant assessment chapters of the ES (**Chapter 8** to **Chapter 30**).

1.1.3 It should be noted that an in-combination assessment is being 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 those other plans, projects and activities that are taken forward in each assessment. An HRA Report has been submitted alongside this ES and that document should be consulted for further information relevant to the assessment of effects on European Sites.

2 Legislation, Policy and Guidance

2.1 Legislative context

2.1.1 Dogger Bank Teesside A & B is subject to Environmental Impact Assessment (EIA) under the requirements of the Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2012.SI 2012/787 (The EIA Regulations). Schedule 4 of The EIA Regulations states that an ES should include:

"A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:

The existence of the development;

The use of natural resources;

The emission of pollutants, the creation of nuisances and the elimination of waste,

And the description by the applicant of the forecasting methods used to assess the effects on the environment."

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

2.2 Policy

2.2.1 The CIA has been undertaken with specific reference to the relevant National Policy Statements (NPS). These are the principal decision making documents for NSIP. Those relevant to Dogger Bank Teesside A & B are:

- Overarching NPS for Energy (EN-1) (DECC 2011a);
- NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011b); and
- NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011c).

2.2.2 The assessment requirements relevant to CIA are summarised in **Table 2.1**, together with an indication of the ES chapter where each is addressed.

Table 2.1 NPS assessment requirements for CIA

NPS requirement	NPS reference	ES reference
Information should be provided on "*how the effects of the applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been sought or granted, as well as those already in existence)*".	EN-1	Considered throughout
Military and civil aviation: any assessment on aviation or other defence interests should also assess the cumulative effects of the project with other relevant projects in relation to aviation and defence.	EN-1, paragraph 4.19.12	**Chapter 19 Military Activities and Civil Aviation**
"*Consider and quantify the different types of flooding (whether from natural and human sources and include joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made*".	EN-1, paragraph 5.7.5	**Chapter 24 Geology Water Resources and Land Quality**
Socio-economic: cumulative effects – 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.	EN-1, paragraph 5.12.3	**Chapter 22 Socio-economics**
Intertidal habitat: where cumulative effects are predicted as a result of multiple export cable routes in the intertidal zone, it may be appropriate for applicants of various schemes to work together to ensure that the number of cable crossings are minimised and installation and decommissioning phases are coordinated in order to reasonably minimise potential disturbance.	EN-3, paragraph 2.6.89	**Chapter 12 Marine and Intertidal Ecology**
Subtidal habitat: where cumulative effects are predicted as a result of multiple cable routes in the subtidal zone, it may be appropriate for applicants of various schemes to work together to ensure that the number of cable crossings are minimised and installation and decommissioning phases are coordinated in order to reasonably minimise potential disturbance.	EN-3, paragraph 2.6.119	**Chapter 12 Marine and Intertidal Ecology**
Marine mammals: the assessment of the effects on marine mammals should include the duration of the potentially disturbing activity including cumulative effects with other plans or projects.	EN-3, paragraph 2.6.92	**Chapter 14 Marine Mammals**
Shipping and navigation: the navigation risk assessment will necessitate cumulative risks associated with the development and other developments (including other wind farms) in the same area of sea.	EN-3, paragraph 2.6.164	**Chapter 16 Shipping and Navigation**
Seascape and visual impact assessment: where appropriate, cumulative SVIA should be undertaken in accordance with the guidance on cumulative assessment outlined in EN-1 (DECC, 2011a).	EN-3, paragraph 2.6.215	**Chapter 20 Seascape and Visual Character** and **Chapter 21 Landscape and Visual Impact Assessment**
Seascape and visual impact assessment: 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.	EN-5, paragraph 2.8.2	**Chapter 20 Seascape and Visual Character** and **Chapter 21 Landscape and Visual Impact Assessment**

2.3 Guidance

2.3.1 Guidance that is applicable to a specific assessment is identified in the relevant chapter (**Chapters 8 – 30**).

2.3.2 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).

2.3.3 Also of relevance to the general approach taken is Advice Note Nine, published by the Planning Inspectorate (Version 2, 2012). Key points from the advice note are summarised in the following section.

Using the 'Rochdale Envelope' – Advice Note Nine: Rochdale Envelope

2.3.4 The Planning Inspectorate has published an advice note (April 2012) addressing the use of the 'Rochdale Envelope' approach under the Planning Act 2008 (as amended by the Localism Act 2011).

2.3.5 The Rochdale Envelope approach is used to ensure that an EIA is based on assessing the realistic worst-case scenario where flexibility or a range of options are sought as part of a consent application (see **Chapter 4 EIA Process**). It is currently routinely applied to the assessment of UK offshore wind farm developments.

2.3.6 As set out in the advice note, the approach relates to EIA applied to individual projects as well as with other major developments. Such developments would be identified through consultation with relevant authorities and will include those identified as being:

- Under construction;
- Permitted application(s), but not yet implemented;
- Submitted application(s) not yet determined;
- Projects on the Planning Inspectorate's Programme of Projects;
- Identified in the relevant Development Plan (and emerging Development Plans - with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited; and
- Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

2.3.7 This list of developments is also reiterated in the Department for Communities and Local Government Guidance on the pre-application process (January 2013), which also states that:

"It may not always be easy for applicants to assess potential impacts fully due to lack of available information. In such circumstances, applicants should take a pragmatic approach when determining what is feasible and reasonable."

2.3.8 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.

2.3.9 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.

3 Consultation

3.1 General approach to consultation

3.1.1 To inform the ES, Forewind has undertaken a thorough pre-application consultation process, which has included the following key stages:

- Scoping Report submitted to the Planning Inspectorate (May 2012);
- Scoping Opinion received from the Planning Inspectorate (June 2012);
- First stage of statutory consultation (in accordance with sections 42 and 47 of the Planning Act 2008) on Preliminary Environmental Information (PEI) 1 (report published May 2012); and
- Second stage of statutory consultation (in accordance with sections 42, 47 and 48 of the Planning Act 2008) on the draft ES designed to allow for comments before final application to the Planning Inspectorate.

3.1.2 In addition, consultation associated with the Dogger Bank Creyke Beck A & B application (Forewind, August 2013) has been taken into account for Dogger Bank Teesside A & B where appropriate.

3.1.3 In between the statutory consultation periods, Forewind consulted specific groups of stakeholders on a non-statutory basis to ensure that they had an opportunity to inform and influence the development proposals. Consultation undertaken throughout the pre-application development phase has informed Forewind's design decision making and the information presented in this document. Further information detailing the consultation process is presented in **Chapter 7 Consultation** and the relevant assessment chapters (**Chapters 8 – 30**). A consultation Report is also provided alongside

3.1.4 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, queries specifically on the CIA have been set out in **Table 3.1**. A considerable number of comments, issues and concerns raised during consultation have been addressed during consultation meetings and hence have not resulted in changes to the content of the ES. A full explanation of how the consultation process has shaped the ES, as well as tables of all responses received during the statutory consultation periods, is provided in the Consultation Report.

3.2 Specific consultation on the approach to offshore CIA

Examining Authority and statutory consultees

3.2.1 In order to address the challenges associated with conducting CIA in the offshore environment, Forewind has developed a strategy for the assessment of offshore cumulative impacts (CIA Strategy, **Appendix 4A**). The strategy sets out Forewind's approach to CIA, based on the target to achieve consent for 7.2GW of projects in the Dogger Bank Zone, and establishes a framework by

which an informed, defensible and reasonable list of other plans, projects and activities can be selected to take forward in the assessment (see Section 4 for further details).

3.2.2 The document has been used as the basis for consultation with stakeholders on the key elements of the approach to CIA from the earliest stages of the assessment process. Key consultation has included:

- The Planning Inspectorate in June 2012;
- The Marine Management Organisation (MMO), the Centre for Environment Fisheries and Aquaculture Science (Cefas), the Joint Nature Conservation Committee (JNCC), Natural England (NE), the Wildlife Trust and the Royal Society for the Protection of Birds (RSPB) during Dogger Bank Creyke Beck A & B PEI 2 workshops in April 2012;
- DFDS Ferries, Cemex, the Danish Fisherman's Association, the Cruising Association, RWE Dea, National Federation of Fisherman's Organisations (NFFO), Associated British Ports (ABP), Maritime Coastguard Agency (MCA) and GDF Suez at a shipping hazard workshop in May 2012; and
- English Heritage, the Council for British Archaeology and the University of Birmingham, on the general approach to the CIA, at an archaeology workshop in September 2012.

Southern North Sea Offshore Wind Forum

3.2.3 Recognising the importance of developing a consistent framework for the assessment of cumulative impacts across other relevant offshore wind farm projects, Forewind has also engaged and consulted with the developers of the other Round 3 offshore wind farm zones in the southern North Sea (combined with the Dogger Bank Zone, this group is collectively referred to as the Southern North Sea Offshore Wind Forum, SNSOWF):

- The East Anglia Offshore Wind Farm Zone, being developed as the East Anglia Offshore Wind (EAOW) joint venture by ScottishPower Renewables and Vattenfall Wind Power; and
- The Hornsea Zone, being developed by SMart Wind Ltd, a joint venture between Mainstream Renewable Power and Siemens Project Ventures GmbH.

3.2.4 EAOW and SMart Wind were consulted on the CIA Strategy as it was developed, with the intention that individual projects being developed across the three different zones could have a common framework and baseline available on which to undertake CIA.

Table 3.1 Summary of consultation

Date and form of consultation	Consultee	Summary of issue	Section reference
20 December 2013, Statutory consultation on the Draft ES	Epic Regeneration	13: Summary - Needs significant amending in light of comments and concerns to reflect the impact on inshore trawler activity.	This has been noted and amendments have been made where appropriate.
20 December 2013, Statutory consultation on the Draft ES	Epic Regeneration	11: Para 11.5.5, 11.5.7 to 11.5.9 - Figure 11.7 indicates that the demersal mobile gear value for the A & B Export Cable Corridor is, in fact, high in the inshore area and medium to high for the proposed route of the C & D corridor, not low to moderate as this paragraph states. Our comments on the magnitude of effect for our clients, as stated previously, stand.	Text in paragraph 11.5.5 has been amended, however, Forewind has followed current standard EIA practice in assessing impacts at a fishing fleet level, and therefore the impacts assessed are valid.
20 December 2013, Statutory consultation on the Draft ES	Epic Regeneration	11: Fig 11.2 - : The second cable corridor marked on the map cuts through some of the most profitable fishing grounds remaining to our clients. We would therefore suggest that the cumulative impact of the construction, operation, and decommissioning of Dogger Bank A & B, when taken together with Dogger Bank C & D; the Breagh pipeline; the Teesside Offshore Wind Farm; and the increasing number and tonnage of ships using Teesport will be severely adverse for Hartlepool's inshore trawler fleet, particularly if either Hartlepool or Teesport are selected as construction and maintenance ports.	This has been considered in the CIA Sections in **Chapter 13 Fish and Shellfish Ecology** and **Chapter 15 Commercial Fisheries**. The Breagh pipeline is operational and therefore already impacting the inshore fishermen and part of the baseline it is not, therefore, further assessed in the CIA.
20 December 2013, Statutory consultation on the Draft ES	Epic Regeneration	11: Para 11.1.10 - It is essential that you consider the cumulative impact of any development and growth plans for Teesport, particularly where these will lead to either an increase in the volume of shipping or the average tonnage of vessels using the port.	Due to the limited information available on future port and shipping developments the NRA considers a set 10% (in the case of Dogger Bank Teesside A & B) to assess a future case traffic level. A future case assessment has been undertaken demonstrating what traffic will look like but without being specifics as to where that traffic may or may not come from.
20 December 2013, Statutory consultation on the Draft ES	Epic Regeneration	11: Para 11.1.10 - We would strongly contest the notion that existing projects, activities and plans are considered to be part of the existing baseline and are therefore not included in the cumulative assessment. Two new developments have been introduced (the Breagh pipeline and the Teesside Offshore Wind Farm) which have reduced our clients' ability to fish on	The Forewind CIA strategy is detailed in **Appendix 4A Forewind Cumulative Impact Assessment Strategy - Offshore**. The strategy follows the Guiding Principles for Cumulative Effects Assessment that were produced by RenewableUK and endorsed by the Offshore Renewable Energy Licensing Group (ORELG). In line with the

Date and form of consultation	Consultee	Summary of issue	Section reference
		traditional grounds – not only through the actual loss of area covered by these developments, but also due to the previously mentioned unintended loss caused by the displacement of shipping anchorages. Whilst the cumulative impact of the Teesside Offshore Wind Farm is mentioned, there is no reference to the Breagh pipeline.	Forewind CIA strategy, operational projects are considered as part of the baseline as they are already impacting the existing environment. Therefore they are not taken through to the Cumulative Impact Assessment. At the time of carrying out the assessments the Teesside Offshore Wind Farm was in construction and therefore included in the cumulative impact assessment, whereas the Breagh pipeline was operational and already deemed to be part of the existing baseline
20 December 2013, Statutory consultation on the Draft ES	MMO	Details of the National Grid's Yorkshire and Humber Carbon Capture and Storage Cross Country Pipeline project can be found on the PINS website. This website should be reviewed prior to submission to PINS to ensure that all relevant cumulative impacts are assessed within the final ES.	This is noted by Forewind.
20 December 2013, Statutory consultation on the Draft ES	MMO	The CIA presented in Chapter 33 presents list of both onshore and offshore plans, projects and activities which have been taken forward into the assessment. We strongly advise that the National Grid's Yorkshire and Humber Carbon Capture and Storage Cross Country Pipeline project is include in both Table 4.3: List of onshore plans, projects and activities taken forward for CIA for onshore topics (page 15) and Table 5.24: Cumulative Impact Assessment Screening for air quality offshore (page 86).	These projects have not been included in the CIA assessment as the pipeline for this project does not fall within the Dogger Bank Teesside A & B study area.
20 December 2013, Statutory consultation on the Draft ES	MMO	1.6.1. It is unclear from reading Chapter 33 in isolating which offshore plans, projects and activities have been included in the Cumulative Impact Assessment (CIA). It is recommended that a table be produced similar to Table 4.3: List of onshore plans, projects and activities taken forward for CIA for onshore topics (page 15) for offshore plans, projects and activities. It is important that in addition to plans and projects which have either been consented or are currently being determined, all reasonably foreseeable plans and projects are considered for inclusion within the CIA. Where plans and projects are screened out of this assessment, the Applicant should provide robust rational for doing so. We would be happy to work with the Applicant to agree the plans and projects to be included	Comment noted – all projects considered in the cumulative impact assessment have already been listed in their respective chapters, therefore a list has not been included in this summary chapter. See also **Appendix 4A Forewind Cumulative Impact Assessment Strategy - Offshore**

Date and form of consultation	Consultee	Summary of issue	Section reference
		within the CIA.	
20 December 2013, Statutory consultation on the Draft ES	NFFO	The cumulative impact assessment upon fisheries does not currently address proposed management measures for fisheries within the Dogger Bank SAC. We would expect this to represent a significant additional impact upon fishing activity in the area.	This has been addressed in **Chapter 15 Commercial Fisheries** Table 11.2 and Section 6.
13 December 2013, Statutory consultation on the Draft ES	JNCC/NE	143.1 CIA: NE advises that the CIA in the HRA report will need to incorporate the impacts of already-operational OWF (in 7.2.17), due to the potential for existing projects to have ongoing effects on long-lived but slow-to-mature seabird populations. Built, operational developments are not part of an HRA in-combination assessment, but they are part of an existing baseline of impacts and so built, operational windfarms should form part of the assessment but not part of the in-combination element of the assessment unless there are residual effects. Natural England is concerned that Table 7-2 does not appear to consider cumulative impacts arising from some built, operational projects, projects and others that, whilst not yet in the planning system, are clearly foreseeable (i.e. remaining Round 3 schemes) and a small number of other North SEA OWF. JNCC and NE suggest the use of a tiered approach.	This has been addressed in **HRA Appendix A**.

4 Assessment Approach

4.1 Offshore CIA strategy

4.1.1 As identified in Section 3, the offshore CIA Strategy (available in full at **Appendix 4A**) sets out Forewind's approach to CIA for the development of projects within the Dogger Bank Zone, up to the target capacity of 7.2GW.

4.1.2 In the past, offshore wind farm developers have undertaken CIA in accordance with the 'building block' approach, which has involved the consideration of cumulative impacts associated with projects at more advanced or similar stages of development. This approach was developed in recognition of the fact that data and information relating to future developments was often not readily available in a format that would inform a robust assessment.

4.1.3 The development of the Forewind CIA Strategy has been aimed at addressing concerns that a building block approach might not adequately consider the whole development potential of the Dogger Bank Zone and the Round 3 plan in general.

4.1.4 Forewind has taken advice and guidance from various sources in developing a strategy to address these concerns (Sections 2 and 3). In its simplest form the strategy involves consideration of:

- Whether impacts on a receptor can occur on a cumulative basis between the wind farm project(s) subject to the application(s) and other wind farm projects, activities and plans in the Dogger Bank Zone (either consented or forthcoming); and
- Whether impacts on a receptor can occur on a cumulative basis with other activities, projects and plans outwith the Dogger Bank Zone (e.g. other offshore wind farm developments), for which sufficient information regarding location and scale exist.

4.1.5 In this manner, the assessment considers (where relevant) the potential for cumulative impacts in the following sequence:

- With the first phase of development in the Dogger Bank Zone, known as Dogger Bank Creyke Beck A & B;
- With the third phase of development in the Dogger Bank Zone, known as Dogger Bank Teesside C & D;
- With the above, plus any other activities, projects and plans in the Dogger Bank Zone; and
- With all of the above, in addition to any other activities, projects and plans outwith the Dogger Bank Zone.

4.1.6 Future development in the Dogger Bank Zone is screened out on account of low confidence in both the projects details (project design details, including project

boundaries, are yet to be confirmed) and the project data (and insufficient baseline data being available).

4.1.7 The strategy recognises that data and information sufficient to undertake an assessment will not be available for all potential projects, activities, plans and/or parameters, and establishes the 'confidence' in the data and information available using a four point ranking scale (full details at **Appendix 4A**).

4.1.8 Following the assessment of data and information confidence, it is possible to undertake the CIA as a two-step process involving screening and the subsequent identification of a level of impact, in line with the EIA process described in **Chapter 4**.

4.2 Applying the offshore CIA strategy

General process (Figure 4.1)

4.2.1 Once the Forewind CIA Strategy had been developed and consulted on, the starting point for the process of applying the strategy was to identify an exhaustive list of those other plans, projects and activities of potential relevance to the CIA (termed the 'CIA Project List'). The process of compiling the CIA Project List is further explained in the section below.

4.2.2 The CIA Project List was reviewed with respect to discipline in order to identify projects with the potential for cumulative impacts with Dogger Bank Teesside A & B. The confidence in the data and information for the projects identified for each discipline was subsequently ranked and any assessed as low or very low removed from further consideration in the process. The ranking process considered both project data (i.e. information available on project timings, location and nature of the works involved) and EIA data (i.e. quality and quantity of available survey and assessment information on which to base an assessment).

4.2.3 Those projects where the confidence was identified as being higher were taken forward for detailed assessment as part of the CIA (**Figure 4.1**).

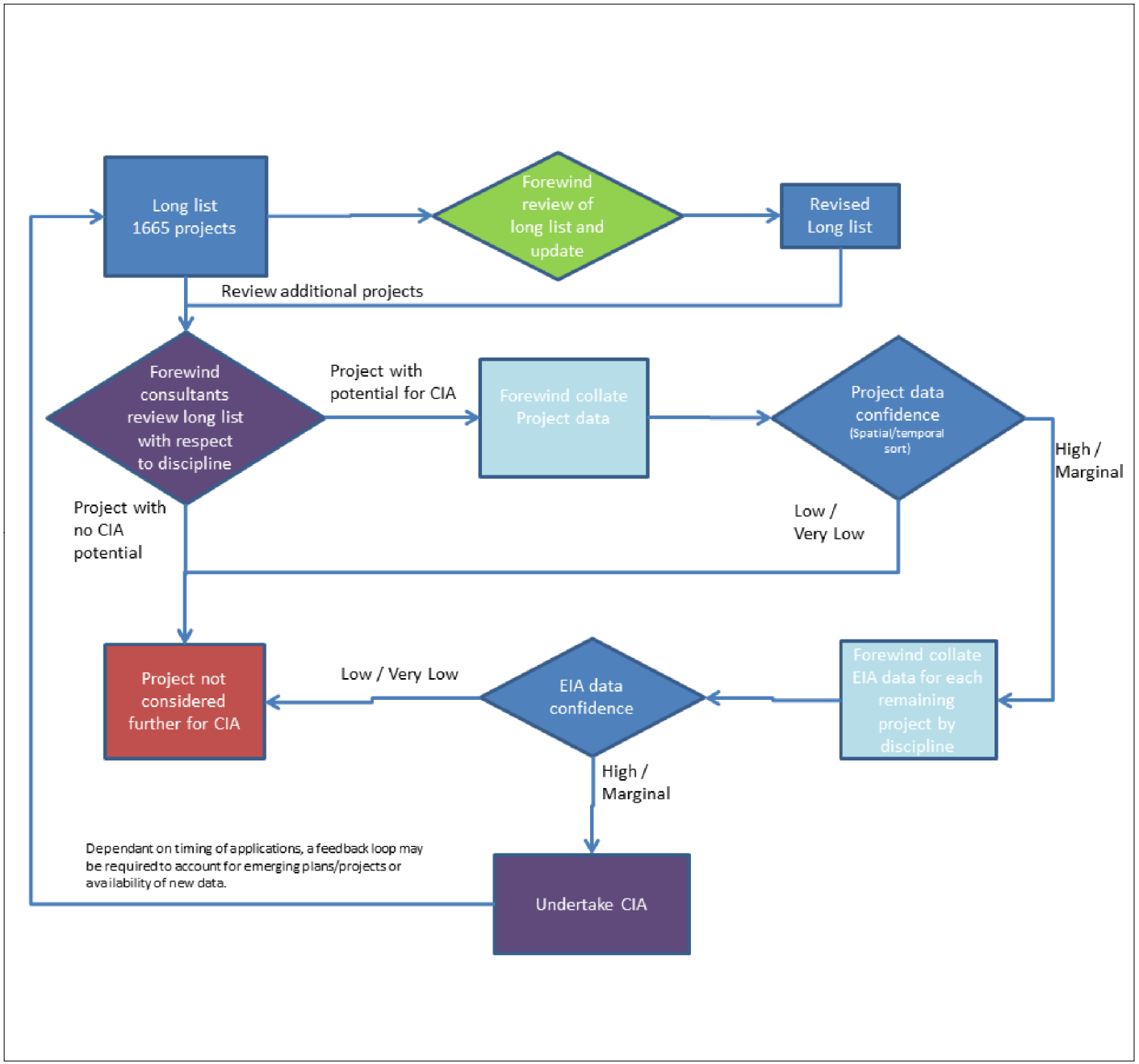
Other plans, projects and activities 'CIA Project List'

4.2.4 As discussed above, a list of other plans, projects and activities was compiled as the starting point for the CIA. The study area on which the list was based was made as wide as possible to ensure that all projects with the potential for cumulative effect were included. This included the identification of projects by activity type (e.g. aggregate extraction) for each country with a North Sea border from Belgium and the Thames Estuary in the southern North Sea to the Shetland Isles and Norway in the north.

4.2.5 In order to thoroughly assess any potential cumulative projects for fisheries, the study area for this activity was expanded to include the English Channel and the Irish Sea, in recognition of the fact that fishermen from various EU countries use all three water bodies.

4.2.6 The collation of projects within the CIA Project List has been an iterative process involving consultation with stakeholders and technical specialists undertaking the assessment. In this manner, it has been updated through the assessment

process to reflect the latest available information and to incorporate the confidence rankings of the associated project and EIA data.



PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.1 CIA Strategy process for Dogger Bank Teesside A & B

VER	DATE	REMARKS	Drawn	Checked
1	15/10/2013	PEI3	GC	AL
2	18/03/2014	DCO Submission	GC	AL

DRAWING NUMBER:

F-OFL-MA-607

SCALE	PLOT SIZE	DATUM	PROJECTION
	A4		

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4.3 Conducting the offshore cumulative assessments

Screening

4.3.1 The first step in the CIA undertaken within each technical chapter (e.g. marine mammals) involved an appraisal of the key impacts relevant to each of the receptors identified in the EIA (**Table 4.1**). For each impact, the potential for impacts to occur on a cumulative basis was identified, both within and beyond the Dogger Bank Zone; the confidence in the data and information available to inform the CIA was appraised (following the methodology set out in **Appendix 4A**); and the other activities that could contribute to these impacts identified.

4.3.2 This also identifies where cumulative impacts are not anticipated, thereby screening them out from further assessment.

Table 4.1 Example from technical chapters CIA screening table step one – impacts

Impact	Dogger Bank Zone (within 1km)		Beyond 1km from the Dogger Bank Zone		Rationale for where no cumulative impact is expected
	Potential for cumulative impact	Data confidence	Potential for cumulative impact	Data confidence	
Impact 1	Yes or no	Very low to high	Yes or no	Very low to high	e.g. absence of other projects with potential for cumulative impacts
Impact 2	etc.				

4.3.3 Where the first screening step has indicated the potential for cumulative impacts, the second step in the assessment within each technical chapter involved a consideration of the actual individual plans, projects and activities within those broad industry levels for inclusion in the CIA, as set out in the CIA Project List. The list has been appraised, based on the confidence Forewind has in being able to undertake an assessment from the information and data available, enabling individual plans, projects and activities to be screened in or out.

4.3.4 The plans, projects and activities relevant to each topic are presented in tabular format (**Table 4.2**), along with the results of the screening exercise that identifies whether there is sufficient confidence to take these forward in a detailed cumulative assessment, or whether they can be screened out on account of distance to the receptor in question.

4.3.5 It should be noted that:

- Where Forewind is aware that a plan, project or activity could take place in the future, but has no information on how the plan, project or activity will be executed, it is screened out of the assessment; and
- Existing projects, activities and plans are considered to be a part of the established baseline and are therefore not included in the cumulative assessment.

Table 4.2 Example from technical chapters CIA screening table step two – projects

Type of project	Project title	Project status	Predicted construction/development period	Distance from Dogger Bank Teesside A & B (km)	Confidence in project details	Confidence in project data	Carried forward to CIA?	Rationale for not carrying into CIA
Offshore Wind Farm	Example 1							
Offshore Wind Farm	Example 2							
Oil and Gas	etc.							

Assessment

4.3.6 Following the screening of impacts and projects the CIA has been undertaken in line with the methodology set out in **Chapter 4**.

4.3.7 The level of any residual cumulative impacts is identified along with, where necessary, details of any relevant mitigation measures. Wherever possible, mitigation is applied at the project level to remove, or reduce to an acceptable level, the impacts that occur within the Dogger Bank Zone, significantly reducing the likelihood and scale of any potential cumulative impacts.

4.4 Onshore CIA strategy

4.4.1 The onshore CIA involves consideration of whether impacts on a receptor can occur on a cumulative basis between the onshore elements of Dogger Bank Teesside A & B and other onshore plans, projects and activities for which sufficient information regarding location and scale exist.

4.4.2 A list of other plans, projects and activities within the planning system relevant to Dogger Bank Teesside A & B was compiled and reviewed using professional judgement. Consideration was given to plans, projects and activities where a potential cumulative impact was anticipated with the works associated with Dogger Bank Teesside A & B and for which sufficient information was available to undertake a meaningful assessment.

4.4.3 This list of plans, projects and activities (provided in **Table 4.3** and shown in **Figure 4.2**) was agreed in consultation with Redcar and Cleveland Borough Council (RCBC) in January 2013. This list was then periodically reviewed during the EIA process, and updated with new information. Forewind consulted with RCBC on the revised list, and it was taken forward for consideration within each of the onshore chapters of this ES.

4.4.4 To inform the onshore CIA, the review of plans, projects and activities was based on:

- Project type;
- Description;
- Expected construction date;
- Planning Status; and
- Distance from project to Dogger Bank Teesside A & B.

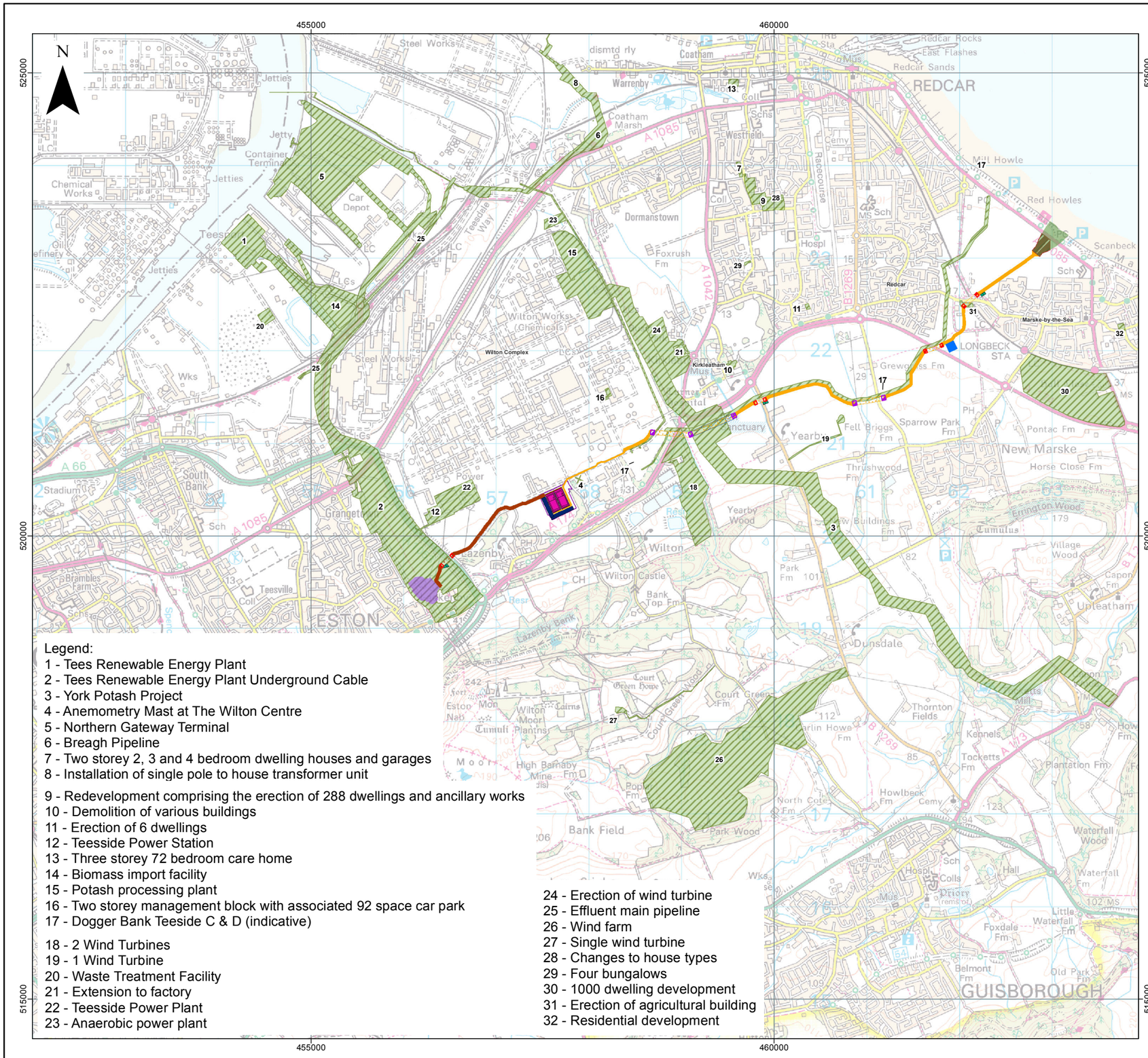
4.4.5 For each onshore topic a narrative is provided for each of the projects identified within **Table 4.3** discussing the potential for a cumulative impact.

Table 4.3 List of onshore plans, projects and activities taken forward for CIA for onshore topics

Project Name	Description	Expected Construction Date	Approximate distance from Project to Dogger Bank Teesside A & B (Km) Project Boundary
Tees Renewable Energy Plant	300MW biomass power station	Expected to be operational in 2015	3.5
Tees Renewable Energy Plant Underground Cable	400kV underground cable	Expected to be operational in 2015	0.0 (intersects project)
York Potash Project	Underground pipeline to transport potash	Application was expected November 2012, however to date no application has been submitted	0.0 (intersects project)
Anemometry Mast at the Wilton Centre	Installation of a temporary 70m high anemometry mast	Approved Feb 2011, construction must begin within 3 years	0.03
Northern Gateway Terminal	Approval of reserved matters following the approval of outline planning permission for a container terminal	Outline permission given in 2007. Oct 2012 decision: Grant Reserved Matters	2.7
Breagh Pipeline	Installation of an underground natural gas and mono ethylene glycol pipeline including a beach valve compound	Approved April 2012, development must begin within three years.	2.8
Two storey 2, 3 and 4 bedroom dwelling houses and garages	Residential dwellings	Planning permission granted Sept 2013, development must begin within 3 years	2.3
Installation of single pole to house transformer unit	Installation of single pole to house transformer unit	Public consultation end Feb 2013	3.4
Redevelopment comprising the erection of 288 dwellings and ancillary works	288 residential dwellings	Granted planning permission Feb 2013.	2.0
Demolition of various buildings at Kirkleatham Hall School	Demolition of various buildings and replace with new buildings and associated landscaping and boundary changes.	Grant deemed consent Feb 2013, development must begin within 3 years	0.5
Erection of 6 dwellings	Six residential dwellings	Granted planning permission Feb 2013, development must begin with 3 years	0.8
Teesside Power Station	Demolition of 8 exhaust stacks	Permission not required Dec 2012	0.3
Three storey 72 bedroom care home	72 bed care home	Planning permission granted Mar 2013, development must begin within 3 years	3.3
Screening opinion request for new biomass import facility	Biomass import facility	EIA not required, Nov 2012	3.1

Project Name	Description	Expected Construction Date	Approximate distance from Project to Dogger Bank Teesside A & B (Km) Project Boundary
Screening opinion for proposed potash processing plant	Potash processing facility	Insufficient info in planning application, Nov 2012	1.9
Erection of commercial buildings (SABIC UK Petrochemicals)	Temporary two storey management block and parking	Planning permission granted Dec 2012, development must begin within 3 years	0.6
Dogger Bank Teesside Projects C & D	Offshore wind farm and onshore grid connection	Application expected in 2015	0 (intersects project)
Scoping request for 2 wind turbines (Savills)	Two wind turbines including compound	Scoping Opinion	0 (intersects project)
Renewable energy	1 Wind Turbine	Application withdrawn	N/A
Waste Treatment Facility (Impetus Waste Management Limited)	Waste Treatment Facility for bioremediation and treatment of hazardous wastes	Public consultation ended Oct 2013	3.2
Elring Klinger (GB) Ltd Extension to Factory	Extension to existing factory building with ancillary new access roads	Planning permission approved	0.7
Teesside Power Plant	Demolition of a power station and associated structures and equipment	Planning permission not required	0.2
Anaerobic Power Plant	Proposed anaerobic digestion and combined heat and power plant	Planning permission granted July 2013, development must begin within 3 years	2.4
Erection of wind turbine	Erection of single wind turbine and associated infrastructure	Planning permission granted Jun 2013 development must begin within 3 years	0.6
Effluent main pipeline (Northumbrian Water)	Installation of above ground effluent main pipeline to replace underground corrosive pipeline	Planning permission granted Aug 2013, development must begin within 3 years	2.4
Development of wind farm (Banks Renewables)	Wind Farm, including 5 wind turbines and associated infrastructure	Public consultation ended Nov 2013	2.9
Single wind turbine	Installation of a single wind turbine and associated infrastructure	Public consultation ended Sept 2013	2.2
Amendment to housing type	Alteration of 30 approved house types to 28 new house types	Public consultation ended Aug 2013	2.2
Erection of four bungalows	Three four bedroomed bungalows and daycare centre including new vehicular and pedestrian access	Planning permission granted Jul 2013, development must begin within 3 years	1.4
Marske-by-the-Sea	Application for up to	Public consultation	0.8

Project Name	Description	Expected Construction Date	Approximate distance from Project to Dogger Bank Teesside A & B (Km) Project Boundary
Housing Development	1000 dwellings together with ancillary uses including a park- and-ride car park, petrol filling station, drive-through, public house/ restaurant and 60 bed hotel	ended Nov 2013	
Erection of agricultural building	Agricultural building	Public consultation ended Sept 2013	0 (intercepts)
Residential Development	Residential development comprising of 14 two storey detached dwellings with new access and landscaping	Planning permission granted Nov 2013, development must being within 3 years	1.1



Legend:

1 - Tees Renewable Energy Plant
2 - Tees Renewable Energy Plant Underground Cable
3 - York Potash Project
4 - Anemometry Mast at The Wilton Centre
5 - Northern Gateway Terminal
6 - Breagh Pipeline
7 - Two storey 2, 3 and 4 bedroom dwelling houses and garages
8 - Installation of single pole to house transformer unit
9 - Redevelopment comprising the erection of 288 dwellings and ancillary works
10 - Demolition of various buildings
11 - Erection of 6 dwellings
12 - Teesside Power Station
13 - Three storey 72 bedroom care home
14 - Biomass import facility
15 - Potash processing plant
16 - Two storey management block with associated 92 space car park
17 - Dogger Bank Teeside C & D (indicative)
18 - 2 Wind Turbines
19 - 1 Wind Turbine
20 - Waste Treatment Facility
21 - Extension to factory
22 - Teesside Power Plant
23 - Anaerobic power plant
24 - Erection of wind turbine
25 - Effluent main pipeline
26 - Wind farm
27 - Single wind turbine
28 - Changes to house types
29 - Four bungalows
30 - 1000 dwelling development
31 - Erection of agricultural building
32 - Residential development

LEGEND

- Teesside A&B cable landfall envelope
- Teesside A&B landfall construction envelope
- Teesside A&B HVDC, Open trench
- Teesside A&B HVDC, HDD
- Teesside A&B HVAC, Open trench
- Teesside A&B HVAC, HDD
- Teesside A&B major horizontal directional drill entry or exit locations (2,000m²)
- Teesside A&B minor horizontal directional drill entry or exit locations (1,200m²)
- HDD or open trench to be confirmed
- Teesside A&B cable route primary construction compound (10,000m² per project)
- Teesside A&B intermediate construction compound (784m²)
- Teesside A&B converter station hall
- Teesside A&B converter stations construction compounds (10,000m² per project)
- Lackenby 400kV substation
- Converter stations site

Cumulative Impacts Assessment

- Projects to be considered within onshore cumulative impact assessment for Dogger Bank Teeside A & B

0 2

Kilometres

Data Source:
Ordnance Survey data © Crown copyright and database right, 2014

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.2: Dogger Bank Teesside A & B - Projects considered within onshore cumulative impact assessment

VER	DATE	REMARKS	Drawn	Checked
3	17/07/2013	Draft	SW	GC
4	29/08/2013	Submit for PEI3	SW	GC
6	18/03/2014	DCO Submission	SW	LC

DRAWING NUMBER:

SCALE	1:45,000	PLOT SIZE	A3	DATUM	OSGB36	PROJECTION	BNG

FOREWIND

4.5 Onshore CIA project information

4.5.1 From **Table 4.3**, a total of 15 projects were identified as having potential for cumulative impacts on onshore topics. Further information on these 15 projects is provided below.

Tees Renewable Energy Plant

4.5.2 Permission was granted for MGT Teesside Ltd to construct the Tees Renewable Energy Plant. This is a 300MW biomass power station that will burn woodchip to generate electricity for the equivalent of 600,000 homes. It will be located within Teesport owned land, adjacent to the River Tees and is expected to be operational in 2015.

Tees Renewable Energy Plant Underground Cable

4.5.3 MGT Teesside Ltd also requested permission for a 400kV underground cable system to connect its proposed energy plant with the national grid substation at Lackenby. The proposed underground cable system will run along the southern side of the Wilton Complex to achieve connection at Lackenby. It is expected to be operational in 2015. The cable installation will include both open trench methods and the use of ducts in more built up areas.

York Potash Project

4.5.4 The York Potash Project comprises a potash mine located approximately 2km south of Sneaton village in the North York Moors and a buried pipeline (approximately 43km long) from the mine to a processing facility within the Wilton Complex. A working width of 45m will be required for installation. This project will be submitted to the Planning Inspectorate in the second quarter of 2013.

4.5.5 The proposals comprise a ‘closed loop’ system for the movement of crushed mineral ore, and based on the information contained within the Scoping Report (submitted to The National Infrastructure Directorate, November 2012) are likely to including the following:

- Two steel pipes of external diameter of 625mm;
- Ore mixing equipment at mine head incorporating step down transformer, mixer/thickener;
- Brine storage tanks;
- Slurry feed tanks;
- Slurry pumps and associated pipework — all sunk below;
- Ground in concrete-lined chambers;
- Intermediate monitoring stations/switchhouses;
- Cathodic protection cables and equipment;
- Construction width corridor of land;
- Temporary and permanent access to and from construction corridor; and

- Storage areas for construction materials and contractors compounds.

Anemometry Mast at the Wilton Centre

4.5.6 A 70m high temporary Anemometry mast is proposed within the northwest of the Wilton Centre, within 50m of the Dogger Bank Teesside A & B converter stations site. Permission was granted in February 2011 and construction must begin within 3 years. The mast is proposed to be in place for 2 years 6 months.

Northern Gateway Terminal

4.5.7 Outline planning permission was granted for PD Teesport Ltd to develop a container terminal in the north of the Wilton Complex in 2007. Approval of reserved matters (access, appearance, landscaping, layout and scale) was granted in October 2012.

Breagh Pipeline

4.5.8 Consent was granted in April 2012 for the Breagh Pipeline project. RWE is proposing to develop the Breagh Field, in the UK sector of the North Sea for the production of gas. The gas will be treated at the Teesside Gas Processing Plant (TGPP) and new pipelines are required to connect the gas field to the TGPP, to both deliver the gas and return the re-generated mono ethylene glycol.

4.5.9 The onshore component of the development includes a beach valve station, an underground energy utility corridor which contains a 20” natural gas pipeline and a 3" mono ethylene glycol pipeline. The pipeline will run from Coatham Sands to the River Tees in Teesport. Modifications are also required to the existing TGPP.

Demolition of various buildings at Kirkleatham Hall School

4.5.10 Planning permission was granted in February 2013 for the demolition of various buildings within the grounds of Kirkleatham Hall School. The buildings will be demolished and replaced with a variety of new school buildings, car parking, boundary fencing and associated landscaping. The project is located between the A1042, A174 in Kirkleatham, within 500m north of the onshore cable route. It is anticipated that works will begin within 3 years on consent being granted.

Erection of six dwellings in Redcar

4.5.11 Planning permission was granted for the erection of the 6 dwellings in February 2013. The site is located off the A174 in Langley Close, Redcar. It is anticipated that works will begin within 3 years of consent being granted.

Teesside Power station

4.5.12 This project is located approximately 1km west of the converter stations site and involves the demolition of eight exhaust stacks within the Teesside Power Station. Planning permission was not required for this project, and the following comment on the planning application was made:

“The exhaust stacks to be demolished are located within a predominately industrial area. It is not considered the demolition of the exhaust stacks and retention of the other equipment on the site will have not a significantly detrimental effect on the surrounding area. The proposed method of demolition

and restoration of the site is considered to be acceptable. Prior Approval of the Local Planning Authority is not therefore required."

Erection of commercial buildings (SABIC UK Petrochemicals)

4.5.13 Full planning permission was requested for the erection of a temporary two-storey management block and temporary 92 car park within the Wilton Complex. This project is located approximately 500m north of the onshore cable route, and construction is anticipated between 2012 and 2015.

Dogger Bank Teesside C & D

4.5.14 Dogger Bank Teesside C & D will comprise two wind farms, each with a generating capacity of up to 1.2GW, and will connect to the National Grid just south of the Tees Estuary. Dogger Bank Teesside C & D will have a total generating capacity of up to 2.4GW.

4.5.15 Dogger Bank Teesside C & D cable route will come onshore to the southeast of Redcar, approximately 0.8km to the north of the Dogger Bank Teesside A & B landfall, where it will pass through agricultural land between Redcar and Marske-by-the-Sea. The route will then follow parallel to that of Dogger Bank Teesside A & B until it reaches the Wilton Complex. The proposed location of the converter stations is a parcel of land within the southeast of the Wilton Complex. Here, the High Voltage Alternating Current (HVAC) may head north towards National Grid substation at Tod Point.

Scoping Opinion for two wind turbine

4.5.16 This project proposes the installation of two wind turbines within land 680m west of Yearby and 650m north of Wilton and falls inside the footprint of Dogger Bank Teesside A & B.

4.5.17 At this stage, very little project information concerning the construction programme or timing has been made available. Therefore a worst case assumption has been made that the construction programme will overlap with Dogger Bank Teesside A & B.

Elring Klinger (GB) Ltd Extension to factory

4.5.18 This project will be located just less than 700m north of the cable route and involves the extension of an existing factory building with ancillary new access roads. Works will be undertaken between 2013 and 2016.

Teesside Power Plant

4.5.19 This project will be located less than 1km from the HVAC cable route and involves the demolition of a power station and associated structures and equipment. Planning permission was not required for this project

Anaerobic Power Plant

4.5.20 This project will involve the development of an anaerobic and combined heat and power plant. The site is located approximately 3km north of the high voltage direct current (HVDC) cable route.

Marske-by-the-Sea Housing Development

4.5.21 The Marske-by-the-Sea Housing development proposes up to 1,000 dwellings and amenities which is likely to include a neighbourhood centre, recreational and leisure facilities, car parks and a hotel. The site is located to the south of Marske-by-the-Sea, east of Longbeck Road and approximately 0.8km to the east of the HVDC cable route.

5 Cumulative Impact Assessment Summary

5.1 Designated sites

5.1.1 The cumulative impact assessment reported in **Chapter 8 Designated Sites** of this ES summarises the cumulative impacts in the context of designated sites, based in turn on the assessments conducted and presented in the relevant receptor lead chapters. These are: **Chapter 11 Marine and Coastal Ornithology**; **Chapter 12 Marine and Intertidal Ecology**; **Chapter 13 Fish and Shellfish Ecology**; **Chapter 14 Marine Mammals; Chapter 24 Geology Water Resources and Land Quality**, and **Chapter 25 Terrestrial Ecology**.

5.2 Marine physical processes

5.2.1 The screening process identified the potential for cumulative effects in relation to an increase in suspended sediment concentration and sediment deposition during all phases, both within and beyond 1km of the Dogger Bank Zone and Dogger Bank Teesside A & B Export Cable Corridor. This was based on the results of hydrodynamic and sediment plume dispersion modelling conducted for Dogger Bank Teesside A & B.

5.2.2 The cumulative assessment within the zone (Dogger Bank Teesside A & B, Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D and aggregates Area 466/1) showed that there is the potential for sediment plumes that would interact, to create a larger overall plume, with higher suspended sediment concentration and, potentially, a greater depositional footprint on the seabed. However, the assessment determined that any deposited sediment would be short-lived with sediment being continually resuspended by natural processes.

5.2.3 Although the potential for cumulative effects was also investigated with a number of other plans and projects outside of the Dogger Bank Zone, no significant cumulative effects were identified. This was largely on account of distance (notably the Hornsea Zone is 75km to the south at its nearest point), as well as the short term and low magnitude nature of the cumulative effects assessed for the plans and projects.

5.3 Marine water and sediment quality

5.3.1 **Table 5.1** provides a summary of the CIA outcomes for marine water and sediment quality.

Table 5.1 Marine water and sediment quality CIA summary

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Construction / decommissioning phase				
Deterioration in water quality due to increases in turbidity	**Minor adverse**	Dogger Bank Teesside C & D, Dogger Bank Creyke Beck A & B	**Minor adverse**	There is potential for simultaneous construction to create a larger overall plume, in low sensitivity water any associated cumulative impact will be temporary.
Deterioration in water quality due to increases in turbidity	**Minor adverse**	With Aggregate Areas 466/1, Dogger Bank Teesside C & D, Dogger Bank Creyke Beck A & B	**Minor adverse**	Plume from aggregate dredging is likely to be small in comparison to combined plume from Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B and therefore impact remains the same as the six wind farm projects combined.
Deterioration in water quality due to increases in turbidity	**Minor adverse**	With Aggregate Areas 485/1 and 485/2, Dogger Bank Teesside C & D, Dogger Bank Creyke Beck A & B	**Minor adverse**	Variation in suspended sediment concentrations from aggregate dredging are unlikely to exceed natural variation and therefore the impact remains as that assessed for the combined plume from Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B.
Deterioration in water quality due to increases in turbidity	**Minor adverse**	Hornsea Projects One and Two, Dogger Bank Teesside C & D, Dogger Bank Creyke Beck A & B.	**Minor adverse**	Plume from Hornsea Project One is predicted to disperse quickly and therefore unlikely to combine with the combined plume from Dogger Bank Teesside A & B,

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
				Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B. Similar conclusions anticipated for the cumulative assessment of Project Two however information to confirm this is not available.
Deterioration in water quality due to increases in turbidity	**Minor adverse**	Teesside Offshore Wind farm and Blyth Demonstrator Project, Dogger Bank Teesside C & D, Dogger Bank Creyke Beck A & B	**Minor adverse**	The only opportunity for cumulative impacts to occur with Teesside Offshore Windfarm is during the operational phase, as the construction will be complete before construction commences on Dogger Bank Teesside A & B. However scour protection at Teesside Offshore Windfarm will prevent there being an operational source of sediment to the water column. The Blyth demonstrator project is very small and an overlap in sediment plumes is deemed unlikely.
Deterioration in water quality due to increases in turbidity	**Minor adverse**	German and Norwegian offshore wind farms, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B.	**Minor adverse**	Distances of these wind farms to the Dogger Bank Zone precludes the opportunity for plumes to overlap.
Operation phase				
Deterioration in water quality due to increases in turbidity	**Negligible**	Dogger Bank Teesside C & D, Dogger Bank Creyke Beck A & B	**Minor adverse**	The impact will be temporary and associated with scour but the plume extent will be much greater than that for Dogger Bank Teesside A & B. Once scouring has reached equilibrium, no further cumulative impact will occur.

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Deterioration in water quality due to increases in turbidity	**Minor adverse**	With Aggregate Areas 466/1, Dogger Bank Teesside C & D, Dogger Bank Creyke Beck A & B	**Minor adverse**	Plume from aggregate dredging is likely to be small in comparison with combined plume from Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B.
Deterioration in water quality due to increases in turbidity	**Minor adverse**	With Aggregate Areas 485/1 and 485/2, Teesside C & D and Creyke Beck A & B	**Minor adverse**	Variation in suspended sediment concentrations from aggregate dredging are unlikely to exceed natural variation and therefore the impact assessment remains as that assessed for the combined plume from Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B.
Deterioration in water quality due to increases in turbidity	**Minor adverse**	Hornsea Projects One and Two, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B	**Minor adverse**	Scour protection provided at Hornsea projects, therefore no operational cumulative impacts are predicted
Deterioration in water quality due to increases in turbidity	**Minor adverse**	Teesside Offshore Wind farm and Blyth Demonstrator Project, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B	**Minor adverse**	The only opportunity for cumulative impacts to occur with Teesside Offshore Windfarm is during the operational phase, as the construction will be complete before construction commences on Dogger Bank Teesside A & B. However scour protection at Teesside Offshore Windfarm will prevent there being an operational source of sediment to the water column. The Blyth demonstrator project is very small and an overlap in sediment plumes is deemed

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
				unlikely.
Deterioration in water quality due to increases in turbidity	**Minor adverse**	German and Norwegian offshore wind farms, Dogger Bank Teesside C & D, Dogger Bank Creyke Beck A & B	**Minor adverse**	Distances of these wind farms to the Dogger Bank Zone preclude the opportunity for plumes to overlap.

5.4 Marine and coastal ornithology

5.4.1 **Tables 5.2** and **5.3** provide a summary of the CIA outcomes for marine and coastal ornithology, focussed on national populations of seabirds and migrant birds. Summaries for BAP priority bird species, OSPAR threatened species and designated sites are available in **Chapter 11**.

Table 5.2 Marine and coastal ornithology CIA summary for Dogger Bank Teesside A & B, Dogger Bank Creyke Beck A & B and Dogger Bank Teesside C & D

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Construction phase				
Disturbance / displacement	**No impact**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**No impact**	Populations of Arctic skua (BAP), black-legged kittiwake (OSPAR), great black-backed gull, great skua, lesser black-backed gull, and northern fulmar
	Short-term **negligible** or **minor adverse**		Short-term **negligible** or **minor adverse**	Populations of Atlantic puffin, common guillemot, little auk, northern gannet, razorbill, and white billed diver
Habitat loss or alteration	Short-term and temporary **negligible** or **minor adverse**		Short-term and temporary **negligible** or **minor adverse**	All seabirds and their populations (including BAP Arctic skua and OSPAR threatened black-legged kittiwake)
Operation phase				
Disturbance / displacement	**No impact**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**No impact**	Populations of Arctic skua (BAP), black-legged kittiwake (OSPAR), great black-backed gull, great skua, lesser black-backed gull, and northern fulmar
	Long-term **negligible** or **minor adverse**		Long-term **negligible** or **minor adverse**	Populations of Atlantic puffin, common guillemot, little auk, northern gannet, razorbill, and white billed diver
Barrier effect	**No impact**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**No impact**	Populations of Arctic skua (BAP), Atlantic puffin, great black-backed gull, great skua, lesser black-backed gull, little auk, and white billed diver
	Long-term **minor adverse**		Long-term **minor adverse**	Populations of black-legged kittiwake (OSPAR), common guillemot, northern fulmar, northern gannet, and razorbill

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
	Long-term **minor adverse**		Long-term **minor adverse**	All migrant birds (including BAP species) and their populations
Collisions	Long-term **negligible to minor adverse**		Long-term **negligible to minor adverse**	All seabirds (including BAP Arctic skua and OSPAR threatened black-legged kittiwake) and their populations
	Long-term **negligible to minor adverse**		Long-term **negligible to minor adverse**	All migrant birds (including BAP species) and their populations
Habitat loss or alteration	Long-term **negligible** or **minor adverse**		Long-term **negligible** or **minor adverse**	All seabirds (including BAP Arctic skua and OSPAR threatened black-legged kittiwake) and their populations
Decommissioning phase				
Disturbance / displacement	**No impact**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**No impact**	Populations of Arctic skua (BAP) , black-legged kittiwake (OSPAR), great black-backed gull, great skua, lesser black-backed gull, and northern fulmar
	Short-term **negligible** or **minor adverse**		Short-term **negligible** or **minor adverse**	Populations of Atlantic puffin, common guillemot, little auk, northern gannet, razorbill, and white billed diver
Habitat loss or alteration	Short-term and temporary **negligible** or **minor adverse**		Short-term and temporary **negligible** or **minor adverse**	All seabirds (including BAP Arctic skua and OSPAR threatened black-legged kittiwake) and their populations

Table 5.3 Marine and coastal ornithology CIA summary for Dogger Bank Teesside A & B, Dogger Bank Teesside C & D, Dogger Bank Creyke Beck A & B and all other projects

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Disturbance / displacement, all phases	**No impact** to **minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D, Beatrice, East Anglia ONE, European Offshore Wind Development Centre / Aberdeen Offshore Wind Farm, Firth of Forth Alpha and Bravo, Galloper, Hornsea Project One, Inch Cape, London Array I/II, Moray Firth, Neart na Gaoithe, and Thanet.	**No impact**	Populations of Arctic skua (BAP), black-legged kittiwake (OSPAR), great black-backed gull, great skua, lesser black-backed gull, and northern fulmar
			Long-term **negligible** or **minor adverse**	Populations of Atlantic puffin, common guillemot, little auk, northern gannet, razorbill, and white billed diver
			Long-term **minor adverse**	All remaining designated sites and their features
			Long-term **moderate adverse**	Common guillemot feature of Buchan Ness to Collieston Coast SPA (and component SSSIs)
Barrier effect	**No impact**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D, Beatrice, Blyth Demonstrator, Breeveertien II, Dudgeon, East Anglia ONE, European Offshore Wind Development Centre / Aberdeen Offshore Wind Farm, Firth of Forth Alpha and Bravo, Galloper, Greater Gabbard, Hornsea Project One, Humber Gateway, Inch Cape, Lincs, London Array I/II, Moray Firth, Neart na Gaoithe, Race Bank, Sheringham Shoal, Teesside Offshore Windfarm, Thanet, Triton Knoll, and Westermost Rough.	**No impact**	Population of Arctic skua (BAP)
	Long-term **minor adverse**		Long-term **minor adverse**	Population of black-legged kittiwake (OSPAR)
Collisions (operation)	Long-term **negligible to minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside	Long-term **negligible**	Populations of common scoter (BAP), little auk and white billed diver

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
		C & D, Beatrice, Blyth Demonstrator, Breeveertien II, Dudgeon, East Anglia ONE, European Offshore Wind Development Centre / Aberdeen Offshore Wind Farm, Firth of Forth Alpha and Bravo, Galloper, Greater Gabbard, Hornsea Project One, Humber Gateway, Inch Cape, Lincs, London Array I/II, Moray Firth, Neart na Gaoithe, Race Bank, Sheringham Shoal, Teesside Offshore Windfarm, Thanet, Triton Knoll, and Westermost Rough.	Long-term **minor adverse**	Populations of Arctic skua (BAP), Atlantic puffin, black-legged kittiwake (OSPAR), common guillemot, great skua, northern fulmar, northern gannet, and razorbill
				All remaining designated sites and their features
			Long-term **moderate adverse**	Populations of great black-backed gull and lesser black-backed gull
				Black-legged kittiwake and northern gannet features of Flamborough Head SSSI and pSPA
				Great black-backed gull feature of East Caithness Cliffs SPA (and component SSSIs)
				Black-legged kittiwake feature of Forth Islands SPA (and component SSSIs)
Habitat loss or alteration	Long-term **minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D, Beatrice, East Anglia ONE, European Offshore Wind Development Centre / Aberdeen Offshore Wind Farm, Firth of Forth Alpha and Bravo, Galloper, Hornsea Project One, Inch Cape, London Array I/II, Moray Firth, Neart na Gaoithe, and Thanet.	Long-term **moderate adverse**	Common guillemot feature of Buchan Ness to Collieston Coast SPA (and component SSSIs)
				Common guillemot and razorbill features of Forth Islands SPA (and component SSSIs)
				Common guillemot and razorbill features of Fowlsheugh SSSI (and SPA)
				Common guillemot and razorbill features of St Abb's Head to Fast Castle SSSI (and SPA)

5.5 Marine and intertidal ecology

5.5.1 **Table 5.4** provides a summary of the CIA outcomes for marine and intertidal ecology.

Table 5.4 Summary of the CIA outcomes for marine and intertidal ecology

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Construction / decommissioning phase				
Temporary physical disturbance to habitats and species	**Negligible** (all VERs apart from VER C) **Minor adverse** (VER C)	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D Hornsea Project One Hornsea Project Two Aggregate Areas 466, 485/1 and 485/2	**Negligible**	Many habitats potentially subjected to temporary disturbance occur widely across the southern North Sea and exhibit low sensitivity and high recoverability to such effects. When six of the proposed Dogger Bank projects are combined with Hornsea Project One and Two and also marine aggregate sites in the wider region around Dogger Bank, a total of 152.19km^2 of temporary habitat disturbance is predicted. This represents 0.23% of similar habitats in the southern North Sea Marine Natural Area, within which much of the Dogger Bank Teesside A & B development lies. It is also assumed that (a) this temporary habitat disturbance will not lead to the permanent loss of a discrete habitat type from the southern North Sea and (b) the habitats affected also exhibit a low sensitivity and high recoverability to such temporary disturbance effects.
Increased suspended sediment concentration and deposition	**Negligible**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D Aggregate Areas 466, 485/1 and 485/2 Hornsea Project One Hornsea Project Two	**Negligible**	Potential exists for construction phase plumes from the six Dogger Bank projects listed here to interact, creating a larger overall plume, with higher suspended sediment concentrations and, potentially, a greater depositional footprint on the seabed. However, given that the numerical modelling undertaken for the individual projects (Dogger Bank Teesside B and Dogger Bank Creyke Beck B) has identified that the maximum thickness of sediment that would remain deposited on the seabed at the end of the 30-day simulation periods would be less than 0.1mm (for both conical GBS and 12m pile foundation scenarios), it is considered, using expert judgment, that the potential for thick sequences of

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
				sediment persistently accumulating on the seabed due to plume interaction from all six projects is low, even if the construction programmes coincide. Cumulative effects of Dogger Bank Teesside A, B, C and D and Dogger Bank Creyke Beck A & B with other offshore wind farms and aggregate license areas have also been considered with respect to sediment plume interaction. It is unlikely that the construction plumes of other wind farms (in particular Hornsea Project One) will interact with the Dogger Bank plumes. Plumes from adjacent aggregate dredging areas would also be small and short-lived in comparison to the Dogger Bank plumes, therefore, no cumulative effects are anticipated via increased suspended sediment plumes and the residual impact remains as **negligible**.
Operation phase				
Permanent loss of habitats	**Minor Adverse** (VERs A, B and C) **Negligible** (VERs D, E, F, G, H and I)	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D Hornsea Project One Hornsea Project Two	**Minor adverse (VERs A, B and C)** **Negligible (VERs D, E, F, G, H and I)**	When six of the proposed Dogger Bank projects are combined with Hornsea Project One and Two, a total of 61.93km^2 of permanent habitat loss is predicted. To place the extent of this permanent habitat loss in context with similar habitat in the wider region, the area of subtidal habitat in the southern North Sea Marine Natural Area, within which much of the Dogger Bank Teesside development lies, amounts to 64,786km^2. Therefore, this cumulative permanent loss of 61.93km^2 of benthic habitat from six Dogger Bank projects and two Hornsea projects represents 0.09% of similar habitat in this part of the southern North Sea alone. It is also assumed that (a) the majority of this permanent habitat loss will arise in habitat types that are widespread across the region and as such, any permanent loss via project developments will not lead to the loss of a discrete habitat type from the southern North Sea and (b) that permanent loss of any particularly sensitive benthic habitats (e.g. Annex I reef) has been avoided by the project-specific EIA processes, which should

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
				have identified any such habitats and proposed appropriate mitigation measures (micro-siting) to avoid damage to these habitats. Therefore, in conclusion, it is predicted that there will be a minor adverse cumulative impact on benthic habitats in the wider region which are the same/similar to those that represent VERs A, B and C within the Dogger Bank Teesside A & B project boundaries, and a negligible cumulative impact on all other benthic habitats across the wider southern North Sea region via permanent habitat loss from projects within the Dogger Bank Zone and other projects outside, specifically Hornsea Project One and Project Two.
Increased suspended sediment concentration and sediment deposition	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D Hornsea Project One Hornsea Project Two Aggregate Areas 466, 485/1 and 485/2	**Minor adverse**	In terms of suspended sediment plumes and deposition created by all six Dogger Bank projects operating concurrently, interaction of plumes and deposition is predicted. Across all projects, suspended sediment concentrations are predicted to be generally greater than 50mg/l, reducing to the background of 2mg/l up to approximately 55km from the project boundaries. Average suspended sediment concentrations are 50-100mg/l across the boundaries of Dogger Bank Teesside A and B, reducing to the background of 2mg/l up to approximately 39km from the project boundaries. After two years, maximum sediment deposition of 5mm occurs across all project areas with deposition reducing to less than 0.1mm up to 43km from the boundaries. Average deposition is predicted to be 0.1-0.5mm reducing to 0.1mm close to the southern boundaries and up to approximately 32km north of the northern boundaries. Therefore, a **minor adverse** cumulative impact is predicted due to the interaction of operational phase plumes from the Dogger Bank Creyke Beck A & B and Dogger Bank Teesside A & B and Dogger Bank Teesside C & D projects as the benthic fauna exposed to the cumulative interaction

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
				of these plumes will be adapted to temporary high suspended sediment loads and sediment deposition.
Direct impact via vessel activity (jacking-up) in O&M phase	**Negligible**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D Hornsea Project One Hornsea Project Two Aggregate Areas 466, 485/1 and 485/2	**Negligible**	Temporary disturbance to benthic habitats is predicted in the operational phase of the project via jacking-up of vessels carrying out O&M works. The predicted amounts of such temporary disturbance across individual projects are small, but, when considered together they do represent a cumulative impact. However, the significance of this cumulative impact is judged to be **negligible.** This conclusion is reached by noting the same factors as outlined above for permanent habitat loss, such as the widespread nature of much of these habitats throughout the southern North Sea, but also noting the fact that the majority of habitats that will be subject to this particular effect will have a low sensitivity to disturbance and a high recoverability.
Introduction of hard substrates to a mainly sedimentary environment	**Negligible**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside A & B Hornsea Project One Hornsea Project Two	**Negligible**	Due to the differences between projects in structure type, and distances between them, effects will be very localised. Evidence from dive surveys in the Dogger Bank region indicates that the species associated with the hard substrates of wrecks are typical of a North Sea rocky reef in a moderate to strong current. Therefore, a **negligible** impact is predicted via (a) the cumulative impact of colonisation of hard substrates and potential change from sedimentary communities to hard substrate communities and (b) potential introduction of non-native species

5.6 Fish and shellfish ecology

5.6.1 **Table 5.5** provides a summary of the CIA outcomes for fish and shellfish ecology.

Table 5.5 Fish and shellfish ecology CIA summary for Dogger Bank Teesside A & B, Dogger Bank Teesside C& D, Dogger Bank Creyke Beck A & B and all other projects

Description of impact		Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Construction					
Temporary disturbance/ loss of the seabed habitat	Direct impacts on eggs and larvae	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	Fish and shellfish, larvae and eggs deemed to be of low sensitivity. Sandeels and herring are considered to be of higher sensitivity. However the impact remains **minor adverse** for both, as sandeels are not present in high densities within Dogger Bank Teesside A & B and potential herring spawning grounds are widespread.
	Adults and juvenile fish and shellfish		Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D		
Suspended sediment and sediment re-deposition	Direct impacts on eggs and larvae	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	Cumulative effects, in terms of seabed disturbance is restricted to interaction of sediment plumes and sediment deposition. There is wide distribution ranges of fish, shellfish, eggs and larvae in comparison to the areas potentially affected. Adult and juvenile fish have the ability to avoid areas of elevated suspended sediment concentrations; therefore cumulative impacts are no greater than for
	Adults and juvenile fish				
	Shellfish				

Description of impact		Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
					Dogger Bank Teesside A & B in isolation.
Construction noise- lethal/ injury effects	Impacts on adults and juvenile fish	**No discernible impact**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	The potential for juvenile and adult fish to be exposed to lethal levels of noise is considered to be small. Impact piling during construction is the activity with the potential to result in the most detrimental impact on fish and shellfish species. The wide spatial distribution of most fish and shellfish species in relation to areas where behavioural reactions may be triggered by piling noise.
	Impacts on adult and juvenile diadromous fish	**Minor adverse**			
	Impacts on larvae	**Minor adverse**			
Construction noise- behavioural effects	Disturbance to spawning fish and nursery grounds	**Minor adverse**			
	Disturbance to migration				
Construction noise- behavioural effects	Effects on prey species/ feeding	**Minor adverse**			
	Shellfish				
Operation					
Permanent loss of habitat- impacts		**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	Cumulative long term habitat loss is predicted to occur as a result of the presence of all offshore wind farm structures. It is difficult to quantify the cumulative area of seabed habitat that is likely to be affected by permanent habitat loss. Comparable seabed habitats are relatively widespread throughout the central North Sea. The fish and shellfish species

Description of impact		Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
					considered to be most vulnerable to habitat loss are demersal spawning species such as sandeel and herring which have specific spawning habitat requirements. In addition, sandeel have specific habitat resource requirements with a preference for sediment with high sand low silt content.
Introduction of hard substrates-impacts		**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	There is the potential for the introduction of hard substrate and the formation of artificial reefs to result in positive effects for edible crab and lobster. Shellfish receptors are deemed to be of medium vulnerability, high recoverability and of regional importance within the fish and shellfish study area.
Electromagnetic fields (EMF)-impacts	Elasmobranchs	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	EMF impacts are considered localised to the subsea cables. Therefore the cumulative impact will be no greater than that assessed for Dogger Bank Teesside A & B in isolation.
	Diadromous migratory species				
	Other fish species				
	Shellfish				
Operational noise		**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	Post construction monitoring from other projects indicates that noise and/ or vibrations from the wind turbines has no impact on the fish community.

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Changes to fishing activity	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	Potential for some decrease in fishing effort within the Dogger Bank Zone during the operational phase.
Decommissioning				
For the purposes of this assessment and in the absence of detailed information on decommissioning schedules and methodologies at this early stage, it is assumed that any impacts derived from the decommissioning phase will at worst be of no greater significance than those derived from the construction phase.				

5.7 Marine mammals

5.7.1 **Tables 5.6** and **5.7** provide a summary of the CIA outcomes for marine mammals.

Table 5.6 Marine mammals CIA summary for Dogger Bank Teesside A & B, Dogger Bank Teesside C & D, and Dogger Bank Creyke Beck A & B.

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Construction phase				
Underwater noise – piling	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For all species.
Underwater noise – vessels	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	All species.
Collision risk – hull impacts	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For cetaceans
Collision risk – hull impacts	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Negligible**	Pinnipeds
Collision risk – ducted propellers	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Negligible**	For grey seals
Collision risk – ducted propellers	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For harbour seals

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Changes in prey resource	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For all species
Operation phase				
Underwater noise – wind turbines	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For all species
Underwater noise – vessels	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For all species
Collision risk – hull impacts	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For cetaceans
Collision risk – hull impacts	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Negligible**	For pinnipeds
Collision risk – ducted propellers	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Negligible**	For grey seals
Collision risk – ducted propellers	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For harbour seals
EMF	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Not assessed**	Screened out from CIA
Physical barrier	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Not assessed**	Screened out from CIA
Changes in prey resource	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For all species
Decommissioning phase				
Underwater noise – cutting of foundations	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	Behavioural response for all species.
Underwater noise – vessels	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank	**Minor adverse**	Behavioural response to vessel noise for all

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
		Teesside C & D		species.
Collision risk – hull impacts	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For cetaceans
Collision risk – hull impacts	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Negligible**	For pinnipeds
Collision risk – ducted propellers	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Negligible**	For grey seals
Collision risk – ducted propellers	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	For harbour seals
Changes in prey resource	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Not assessed**	Screened out from CIA.

Table 5.7 Marine mammals CIA summary for projects outwith the Dogger Bank Zone

Description of impact	Residual impact of Dogger Bank Teesside A and B	Projects with potential for cumulative impact	Cumulative impact	Details
All phases				
Underwater noise (all species)	**As Table 5.6**	Aggregate Areas (Area 466/1, Area 448 (now Area 514/1), Area 449 (now Area 514/3), Area 485/1, Area 485/2, Area 483, Area 484, Area 506, Area 400, Area 439, Area 492, Area 493, Area 454 (now Area 512), Area 495/1, Area 495/2, Area 494, Breagh pipeline, Dogger Bank Creyke Beck A & B and Dogger Bank Teesside C & D, Dudgeon, Firth of Forthrea 495/1, Area 495/2, Area 496 , Area 494, Area 490, Area 491), Breagh Pipeline , Offshore wind (Beatrice, Blyth Demonstration Site (NaREC), Dogger Bank – Creyke Beck A & B Dogger Bank – Teesside C & D, Dudgeon, Firth of Forth – Project Alpha and Project Bravo, Galloper, Greater Gabbard, Hornsea Zone – Project One, Hornsea Zone – Project Two, Humber Gateway, Inch Cape, Kentish Flats Extension, Lincs, London Array II, Moray Firth – Telford, Stevenson and MacColl, Neart na Gaoithe, East Anglia – Project One, East Anglia Three, East Anglia Four, Offshore- Bürger-windpark Butendiek (Germany), Race Bank, Teesside, Triton Knoll, Westermost Rough), Cygnus Alpha, Cygnus Bravo, Ensign, Rochelle, wave and tidal (Cantick Head, Westray South, Brough Head, Costa Head, Inner Sound).	**Moderate adverse** **Minor adverse**	Behavioural disturbance (for harbour porpoise and PTs for grey seal only) All other species
Collision risk	**As above**	As above	**Moderate adverse** **Minor adverse**	Harbour seal All other species
Changes in prey resource	**As above**	As above	**Minor adverse**	All species

5.8 Commercial fisheries

5.8.1 **Table 5.8** provides a summary of the CIA outcomes for commercial fisheries.

Table 5.8 Commercial fisheries CIA summary Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Construction phase				
Complete loss or restricted access to traditional fishing grounds (wind farm construction)	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Flatfish Fishery.** The spatial extent and/or durations of effects will be greater than assessed for the Dogger Bank Teesside A & B construction, but the very low levels of activity within Dogger Bank Teesside C and Dogger Bank Creyke Beck B means the magnitude of the effect is expected be low.
	Minor adverse	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Sandeel fishery.** The low intensity of sandeel fishing effort within Dogger Bank Teesside B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B, and negligible intensity within Dogger Bank Teesside B, and the extent of available fishing areas beyond the sites, means the magnitude of temporary loss of, or restriction to, traditional fishing grounds during construction of Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B is considered to be low.

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
	Moderate adverse	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Moderate adverse**	**Seine net Fishery**. Minimal levels of seine netting activity appear to occur within Dogger Bank Creyke Beck A & B and Dogger Bank Teesside C & D. High densities of activity are however shown to occur in Dogger Bank Teesside A & B. Taking into account the very low levels of activity within Dogger Bank Creyke Beck A & B and Dogger Bank Teesside C & D, the impact will be no greater than Dogger Bank Teesside A & B being assessed in isolation. Fisheries consultation shall be ongoing in order to mitigate concerns.
Complete loss or restricted access to traditional fishing grounds (wind farm construction)	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Gillnet Fishery**. Gill net fishing is predominantly within Dogger Bank Teesside A with negligible levels in Dogger Bank Teesside B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B. The extent of available fishing area in comparison to the area of Dogger Bank Teesside A is very large, and so the cumulative effect is no greater than that of Dogger Bank Teesside A & B in isolation.
Complete loss or restricted access to traditional fishing grounds (cable route installation)	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Whitefish Fishery**. Over-15m vessels fish at very low levels over Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and the Dogger Bank Creyke Beck A & B Export Cable Corridors. Accounting for the very small area of exclusion during installations, the short time frames and the overall extent of the operational areas of the larger vessels the impact is expected to be minor. Under-15m vessels fish at a low to moderate level over Dogger Bank Teesside A & B, Dogger Bank Teesside C

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
				& D and the Dogger Bank Creyke Beck A & B Export Cable Corridors. Although the fishing grounds are not wide spread, the operational ranges of the under-15m vessels are limited. However, as the duration of installation within the fishing grounds will be short, the impact will be minor.
	Minor adverse	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	***Nephrops* fishery.** Valuable *Nephrops* fishery to the north of Dogger Bank Teesside A & B, however, low levels along Dogger Bank Teesside A & B, Teesside C & D and the Dogger Bank Creyke Beck A & B Export Cable Corridors, therefore minor impact.
	Minor adverse	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Scallop fishery.** Low fishing activity occurs to the south of Dogger Bank Teesside A & B Export Cable Corridor, and transects Dogger Bank Creyke Beck A & B Export Cable Corridor in a small section. Therefore cumulative impact is no greater than Dogger Bank Teesside A & B assessed in isolation.
	Minor adverse	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Pelagic fishery.** Minimal fishing effort in this area. Fishing activity occurs over small sections of the Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and the Dogger Bank Creyke Beck A & B Export Cable Corridors, therefore the impact is minor.
	Minor adverse	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Potting fishery**. Vessels potting for crab and *Nephrops* are a geographically limited inshore fishery. However, as the impact is temporary and short term impact during installation, the impact will be minor.

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
	Minor adverse	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Netting fishery.** Low numbers of vessels static netting and drift netting for salmon. It is unlikely that vessels fishing grounds will cover Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and the Dogger Bank Creyke Beck A & B Export Cable Corridors, therefore the cumulative impact is no greater than Dogger Bank Teesside A & B assessed in isolation, i.e. minor.
Interference with fishing activities	**No discernible impact**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**No discernible impact**	In the case of vessels towing mobile gear, due to their comparatively low levels of activity and the fact that, under COLREGS, Forewind works vessels will take the appropriate action so as not to require fishing vessels to alter course when towing their gears. With the appropriate fisheries liaison, and conflict avoidance policies, there should be no interference impacts on the static gear fisheries.
Safety issues for fishing vessels	**Within acceptable limits**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Within acceptable limits**	With compliance with the implemented safety measures, policies and objectives, the cumulative safety risks to fishing vessels and their gears should also be within acceptable limits.
Increased steaming times	Refer to **Chapter 16 Shipping and Navigation**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**N/A**	The main fishing grounds relative to the base ports of the vessels targeting fishing grounds on the Dogger Bank are such that there would be a minimal requirement for traditional steaming routes to be altered.
Adverse impacts upon commercially exploited species	This is discussed in **Chapter 13 Fish and Shellfish Ecology**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**N/A**	N/A
Displacement of fishing activities	**Minor adverse**	Dogger Bank Creyke Beck A & B	**Minor adverse**	The scale of displacement will be a direct function of the complete loss or restricted

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
		Dogger Bank Teesside C & D		access to traditional fishing grounds during the construction period for Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B.
Operation phase				
Complete loss or restricted access to traditional fishing grounds (wind farm)	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Flatfish fishery.** Fishing activity in Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B occurs at only low levels. It is also likely that skippers may elect to fish within the operational projects.
	Minor adverse	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Sandeel fishery.** The combined levels of activity within Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B boundaries are such that the cumulative proportional loss of fishing area remains small.
	Moderate adverse	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Moderate adverse**	**Seine netting**. Due to their mode of operation Danish seine netting is expected to be excluded from Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B for the duration of the operational phases as well as during the construction phases.
Complete loss or restricted access to traditional fishing grounds (wind farm)	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Minor adverse**	**Gillnet fishery.** Gillnetting is a static fishery within Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B and fishing will therefore be able to continue once the wind farm is operational, and cumulative impact of the operational wind farms is minor.

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Complete loss or restricted access to traditional fishing grounds (cable route)	**N/A**	N/A	**N/A**	N/A
Interference with fishing activities	**No discernible impact**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**No discernible impact**	No discernible cumulative impact expected for trawlers and/ or static gear.
Increased steaming times	Refer to **Chapter 16 Shipping and Navigation**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**N/A**	N/A
Decommissioning phase				
All impacts identified at construction phase	**Expected to be similar to but not exceed effects associated with construction**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**N/A**	N/A

5.9 Shipping and navigation

5.9.1 **Table 5.9** provides a summary of the CIA outcomes for shipping and navigation.

Table 5.9 Shipping and navigation CIA summary

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Construction / decommissioning phase				
Impact on navigation	**Negligible to minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	Deviations are considered to be within acceptable limits with adaptable receptors of low sensitivity.
Impact on navigation	**Negligible to minor adverse**	Other UK offshore renewable developments including projects involved in the Southern North Sea Offshore Wind	**Minor adverse**	The review undertaken by the Crown Estate (2012) indicates that by continuing to work with the SNSOWF members until a clear process is defined from the regulators, developers will mitigate this

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
		Forum (SNSOWF)		impact through consultation with relevant organisations within the relevant EU member states, resulting in a minor adverse cumulative impact.
Operation phase				
Impact on navigation	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	Route deviations are expected to be acceptable. The receptors are able to alter course early which does not result in significant transit time.
Impact on navigation	**Minor adverse**	Other UK offshore renewable developments including projects involved in the Southern North Sea Offshore Wind Forum (SNSOWF)	**Minor adverse**	In a similar context to the construction/decommissioning phase, continued work with the SNSOWF members would ensure that the impacts resulting from offshore wind farm developments in the North Sea are suitably mitigated.
Increased risk of collision	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	The cumulative impact of the projects will impact on the vessel to vessel collision risk.
Increased risk of allision	**Minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	The cumulative impacts of the projects may increase vessel to structure allision risk (including NUC).
Impact on lighting and marking	**Negligible to minor adverse**	Dogger Bank Creyke beck A & B, Dogger Bank Teesside C & D	**None identified**	The low numbers of commercial vessels that do transit in the vicinity of the Dogger Bank Zone will not navigate through, or in close proximity to the wind turbines.
Impact on defence activities	**Negligible to minor adverse**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**Minor adverse**	Based on limited defence activities that occur in the vicinity of the Dogger Bank Zone. See **Chapter 19 Military Activities and Civil Aviation** for further details.

5.10 Other marine users

5.10.1 **Table 5.10** provides a summary of the CIA outcomes for other marine users.

Table 5.10 Other marine users CIA summary

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
All phases				
Impacts on other offshore wind farm projects	**Minor adverse to no impact**	Dogger Bank Creyke Beck A & B	**None identified**	Distance to other plans and projects makes any interaction unlikely.
Impacts on CCS	**Minor adverse**	Teesside Offshore Windfarm; and Dogger Bank Creyke Beck A & B	**None identified**	As above but awaiting further detail on the CCS pipeline coastal location.
Impacts on oil and gas	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside A & B	**Minor adverse**	Potential for cumulative noise impacts in relation to seismic surveys and piling noise is noted, although this would only arise from the other developments within the Dogger Bank Zone.
Impacts on subsea cables and pipelines	**Minor adverse**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D; and Teesside Offshore Windfarm	**Minor adverse**	Assessment restricted to the Dogger Bank Teesside A & B Export Cable Corridor and landfall area. Ongoing consultation with other developers will provide agreement on crossings and proximity agreements as well as a comprehensive map of all cables and pipelines.

5.11 Marine and coastal archaeology

5.11.1 **Table 5.11** provides a summary of the CIA outcomes for marine and coastal archaeology.

Table 5.11 Marine and coastal archaeology CIA summary

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
All Phases				
Direct impacts to known archaeological receptors	**No discernible impact**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**None identified**	Cumulative direct impacts to known receptors within Dogger Bank Teesside A & B will not occur due to the avoidance of archaeological receptors using AEZs and micrositing across the Dogger Bank Zone and as there is no geographical overlap with any projects outwith the Dogger Bank Zone.
Direct impacts to potential archaeological receptors	**Negligible**	Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D	**Negligible**	The effect of unavoidable impacts to potential receptors will be mitigated by agreed measures, including the use of ORPAD, set out in a WSI.
Indirect impacts to archaeological receptors	**Negligible**	Offshore wind farms: Dogger Bank Creyke Beck A & B Dogger Bank Teesside C & D Project One of the Hornsea Zone Teesside Blyth Demonstration H2-20 Idunn Energipark Nord-Ost Passat I, II and III. Aggregate license areas: Application Area 466 Application Area 485 (1 and 2)	**None identified**	No significant cumulative effects to physical processes are expected to occur. Hence, there will be no significant cumulative indirect effects to archaeological receptors.

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Impacts to Historic Seascape Character	**Negligible**	All	**Minor**	The introduction of offshore wind farms alongside other planned installations and activities will change the character of the historic seascape character although the ability of the assessed historic seascape character to accommodate change is high
Impacts on the general archaeological resource that traverses the project boundaries	**N/A**	All	**Minor**	The cumulative effect of multiple unavoidable impacts to potential archaeological receptors is mitigated by the widespread adoption of reporting protocols across the offshore renewables, aggregates and, more recently, fishing industries. Overall the percentage of the seabed subject to disturbance is low.
Increased archaeological data and knowledge	**Beneficial impact**	All	**Beneficial impact**	Archaeologically interpreted geophysical and geotechnical data for developments such as this significantly increases understanding of offshore archaeological resources, and in turn the measures required to protect them. Noted that such beneficial effects must be demonstrated via publically available, professional reporting.

5.12 Military activities and civil aviation

5.12.1 **Tables 5.12** and **5.13** provide a summary of the CIA outcomes for military activities and civil aviation.

Table 5.12 Military Activities and Civil Aviation CIA summary

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
All phases				
Impact upon aeronautical Search and Rescue operations	**Negligible**	Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D	**None identified**	No cumulative impact is anticipated outside the Dogger Bank Zone due to the scale and nature of the impacts assessed for Dogger Bank Teesside A & B in its own right (i.e. all impacts are associated with SAR

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
				activities taking place within the project areas).

5.13 Seascape and visual character

5.13.1 **Table 5.13** provides a summary of the CIA outcomes for seascape and visual character.

Table 5.13 Seascape and visual character CIA summary for Dogger Bank Teesside A & B, Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B, Hornsea Round 3 Zone Project One, Hornsea Round 3 Zone Project Two, Cygnus A HUB and Cygnus B NPAI.

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Construction / decommissioning phase				
Impact on seascape character of the landfall and inshore waters	**Minor adverse** (within 2-3km of the landfall)	Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B	**Minor adverse**	The extent of additional construction work along this stretch of coast line in relation to Teesside C & D is likely to lead to some localised, minor temporary impacts within the vicinity of the landfall. Activities will give rise to short term change on the seascape character, reducing to **negligible** in the long term as construction works for both projects comes to an end, as any visible ground disturbance is restored, and as vessels and machinery move away. In relation to Creyke Beck A & B the various construction activities will each affect different landfalls and different cable routes, and the impacts of each will not be felt by the same receptors at the same time, because of their wide separation.
Impact on seascape character of the export cable route	**Negligible**	Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B	**Negligible**	Within the wider context of the southern North Sea, the additional magnitude of change will be low, and the cumulative seascape impacts over and above those resulting from Dogger Bank Teesside A & B in isolation will be

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
				negligible.
Impact on seascape character of the development area within the context of the southern North Sea	**Moderate adverse** (within 20km of the development area)	Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B , Hornsea Round 3 Zone Project One and Hornsea Round 3 Project Two.	**Minor adverse**	Should all wind farm project construction activities overlap the additional magnitude of change will be low and the level of cumulative impacts **minor**. This is because of the wide separation of the projects and because the scale of the projects is small in relation to the scale of the receiving environment (the southern North Sea).
Impact on seascape character of the development area within the context of the southern North Sea	**Moderate adverse** (within 20km from the development area)	Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B , Cygnus A HUB and Cygnus B NPAI.	**N/A**	No cumulative construction impacts are anticipated, as the construction of the Cygnus platforms will not coincide with the construction of the wind farms.
Impact on views at the landfall and inshore waters	**Negligible – moderate adverse** (depending on the receptor location, see **Chapter 21**)	Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B	**Negligible – moderate adverse** (depending on the receptor location, see **Chapter 21)** No impacts predicted in relation to Creyke Beck A & B	Additional cumulative visual impacts will affect land-based visual receptors (within approximately 1km of the landfall) and sea-based visual receptors (out to approximately 2-3km from the shore) reducing to negligible in the long term as construction works for both projects come to an end, as any visible ground disturbance is restored, and as vessels and machinery move away.
Impact on sea-based views	**Moderate adverse** within 20km from the development (see **Chapter 21**)	Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B	**Minor adverse**	Additional cumulative visual impacts will affect sea-based visual receptors within approximately 20km of the outer turbines. Within the wider context of the southern North Sea, the additional magnitude of change will be low, and the cumulative seascape and visual impacts over and above those resulting from the projects in isolation will be **minor**.
Operation phase				

Description of impact	Residual impact of Dogger Bank Teesside A & B	Projects with potential for cumulative impact	Cumulative impact	Details
Impact on seascape character of the wind farm development area within the context of the southern North Sea	**Moderate adverse** reducing to **minor adverse** beyond 20km from the development	Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B	**Minor adverse**	Within the wider context of the southern North Sea, the additional magnitude of change will be low, and the cumulative seascape and visual impacts over and above those resulting from Dogger Bank Teesside A & B in isolation will be **minor**.
Impact on seascape character of the development area within the context of the southern North Sea	**Moderate adverse** reducing to **minor adverse** beyond 20km from the development	Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B , Hornsea Round 3 Zone Project One and Hornsea Round 3 Project Two.	**Minor adverse**	Successive and sequential views of the projects may be available for sea-based receptors, including predominately commercial vessels and fishing vessels of low sensitivity, No cruising routes pass both the Dogger Bank Zone and the Hornsea Zone. The level of cumulative seascape and visual impacts will be **minor**.
Impact on seascape character of the development area within the context of the southern North Sea	**Moderate adverse** reducing to **minor adverse** beyond 20km of the development	Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B , Cygnus A HUB and Cygnus B NPAI.	**Minor adverse**	The introduction of extensive wind turbines in relatively close proximity to oil and gas platforms will have a **minor** adverse cumulative effect within the localised area, decreasing to **negligible** when considered in the context of the southern North Sea.
Impact on sea-based views	**Moderate adverse,** reducing to **minor adverse** beyond 20km of the development.	Dogger Bank Teesside C & D and Dogger Bank Creyke Beck A & B	**Minor adverse**	Additional cumulative impacts on views will arise as a result of development being present over a larger area, increasing the extent and duration of views of wind turbines available to receptors potentially present around the development area. The additional magnitude of change will be low, and the cumulative seascape and visual impacts over and above those resulting from Dogger Bank Teesside A & B in isolation will be **minor**.

5.14 Landscape and visual

5.14.1 This section describes the CIA for landscape and visual impact assessment. A screening exercise was undertaken of the plans, projects and activities (shown in **Table 4.3**) to determine their potential to result in cumulative impacts. The

screening exercise considered spatial and temporal elements of the projects, their size and the level of information available at the time of the assessment.

5.14.2 Those plans, projects and activities which have the potential to result in cumulative impacts for landscape and visual impact assessment are provided below:

- Tees Renewable Energy Plant Underground Cable;
- York Potash Project;
- Anemometry mast at the Wilton Centre;
- Dogger Bank Teesside C & D; and
- Marske-by-the-Sea Housing Development.

Tees Renewable Energy Plant Underground Cable

5.14.3 Assuming a worst case whereby Dogger Bank Teesside A & B and the Tees Renewable Energy Plant underground cable were being constructed at the same time, there will be a concentration of construction activity to the north of Lackenby, between the existing NGET substation at Lackenby and the A1053. The HVAC cable route will intersect with the Tees Renewable Energy Plant Underground Cable within the large, open fields to the west of the A1053. This will include construction compounds, vehicles, stockpiling of materials, and machinery. It is likely that the construction works for both projects will be lit.

5.14.4 The extent of construction works across the landscape will remain relatively contained within an urban-fringe landscape which is of low sensitivity. There will be some localised direct cumulative impacts on the fields within which the works are taking place, but these will be short term in nature, of a low magnitude, giving rise to negligible cumulative impacts. These localised impacts are unlikely to result in impacts on the landscape character of adjacent Landscape Character Unit (LCUs).

5.14.5 There will be additional short term visual change in views experienced by travelling receptors along the A1053 (of low sensitivity), of a low magnitude, giving rise to impacts of minor significance. There will also be short term additional visual change experienced by residential receptors at the eastern edge of Whale Hill, at South Lackenby and Lackenby Lane, of a **negligible** magnitude overall giving rise to **no** significant impacts.

5.14.6 In the longer term both cumulative landscape and visual impacts will reduce to **negligible** as the HVAC cable route will be restored to agricultural fields.

York Potash Project

5.14.7 The existing proposal information indicates that the pipeline route, extending from the mine head to the southwest of Whitby, to the plant within the northeast extent of the Wilton Complex will be routed through part of the Dogger Bank Teesside A & B study area. The proposed route within the study area is through the Eston Hills, passing to the south and west of Yearby, intersecting with the A174 east of Mains Dyke Bridge Roundabout and following parallel to the eastern edge of the Wilton Complex, west of Kirkleatham.

5.14.8 Assuming a worst case whereby Dogger Bank Teesside A & B and the York Potash Project were being constructed at the same time, there will be a concentration of construction activity within the fields between the southeast of the Wilton Complex and Kirkleatham, to the north and south of the A174 and northwest of Yearby. The HVAC cable route will intersect with the pipeline within the large, open fields to the southeast of the Mains Dyke Bridge Roundabout. This is likely to include construction compounds, vehicles, stockpiling of materials, and machinery. It is likely that the construction works for both projects will be lit.

5.14.9 The extent of construction works across the landscape will give rise to localised direct cumulative impacts on the fields within which the works are taking place, but these will be short term in nature. The works will give rise to temporary impacts on the character of a small part of the landscape unit Redcar flats: Lowland Farmland South of Redcar and Marske (LCU R2), which is of medium sensitivity. The magnitude of change will be of a medium magnitude, giving rise to **moderate cumulative** impacts during the construction period. These localised impacts are unlikely to result in impacts on the landscape character of adjacent LCUs.

5.14.10 There will be an additional short term visual change in views experienced by travelling receptors along the A174 (of low sensitivity), of a high magnitude, giving rise to impacts of moderate significance. There will also be an additional short term visual change experienced by residential receptors at the eastern edge of Yearby, and at the southern edge of Kirkleatham, of a medium magnitude overall giving rise to moderate impacts.

5.14.11 In the medium term both cumulative landscape and visual impacts will reduce to **negligible** as the HVAC cable route will be restored to agricultural fields, which will blend back into the surrounding landscape.

Anemometry Mast at the Wilton Centre

5.14.12 Should the anemometry mast at the Wilton Centre be constructed, it will form part of the existing baseline, as construction will be completed before construction for Dogger Bank Teesside A & B commences. As such, construction periods will not coincide, and **no cumulative impacts** will arise.

Dogger Bank Teesside C & D

5.14.13 The following assessment assumes a worst case scenario whereby Dogger Bank Teesside A & B and Dogger Bank Teesside C & D were constructed and/or decommissioned. The four projects may be constructed in sequence, but at this time the potential combined duration of the works is not known. The worst case scenario assumed is that the parameters for the Dogger Bank Teesside C & D landfall, HVDC and HVAC cable route and converter stations are as those for Dogger Bank Teesside A & B, as defined in **Chapter 21 Landscape and Visual**.

Cumulative impacts on landscape character and resources

5.14.14 Concurrent construction activity will be present at two points along the coastal edge between Redcar and Marske, with a distance of circa.0.8km between

them. The activities will give rise to short term change, reducing to negligible in the long term as restoration works for both projects are carried out.

5.14.15 Direct temporary effects on landscape resources and character will result from the concurrent installation of the HVDC cable route for Dogger Bank Teesside A & B and Dogger Bank Teesside C & D. These will be localised in extent and will result in a low additional magnitude of change.

5.14.16 The extent of additional construction work is likely to lead to some localised significant cumulative visual effects on the local area between Redcar and Marske, where the two cable routes converge, but these are unlikely to result in effects on the landscape character of the wider Marske Coastal Farmland and LCUs to the south and west. When considered in a wider context, the additional cumulative effects on landscape resulting from the construction of Dogger Bank Teesside C & D are not predicted to be significant.

Cumulative visual impacts

5.14.17 There will be combined visibility of construction works associated with the converter stations of the four projects within elevated areas to the south, including Eston Hills. However given the industrialised context of these views, the additional cumulative visual change will be negligible from these vantage points.

5.14.18 There will be no additional cumulative impacts on residential receptors within Lazenby, as the Dogger Bank Teesside C & D converter stations will be screened by woodland to the east of the Dogger Bank Teesside A & B site.

Marske-by-the-Sea Housing Development

5.14.19 Assuming a worst case whereby Dogger Bank Teesside A & B and the housing development were being constructed at the same time, there will be a concentration of construction activity within the farmland to the south and west of Marske-by-the-sea (south of the railway line).

5.14.20 There will be an additional short term visual change in views experienced by travelling receptors along the A174 (of low sensitivity) between the southern edge of Redcar and Saltburn-by-the-sea, of a medium magnitude, giving rise to impacts of low significance. There will also be an additional short term visual change experienced by residential receptors located along Longbeck Road to the south of Longbeck Station, where construction of Dogger Bank Teesside A & B will be visible as a further area of activity to the west, although at a greater distance away than the housing development (which will be immediately adjacent to Longbrook Road). The works will give rise to additional visual change of a low magnitude overall giving rise to **moderate** impacts.

5.14.21 In the medium term both cumulative landscape and visual impacts will reduce to **negligible** as the HVAC cable route will be restored to agricultural fields, which will blend back into the surrounding landscape.

Potential Cumulative impacts during operation

Dogger Bank Teesside C & D Converter Stations

5.14.22 The following assumes a worst case scenario whereby both converter stations Dogger Bank Teesside A & B and Dogger Bank Teesside C & D were operational at the same time. The same parameters in terms of the scale and nature of Dogger Bank Teesside C & D are assumed as for Dogger Bank Teesside A & B, as set out in **Chapter 21**.

Cumulative impacts on landscape character and resources

5.14.23 The Wilton Complex LCU (W1) will contain both developments, and its character is therefore likely to change to one which is overall slightly more developed, albeit that it already contains significant built development. Built development at present includes major industrial infrastructure, cooling towers and stacks, with considerable influence across the wider landscape. All this is set within a framework of urban fringe development at the foot of the Eston Hills escarpment and Teesport and Middlesbrough to the north.

5.14.24 Direct long term additional cumulative impacts on landscape resources and character of the Wilton Complex landscape unit (LCU W1) will result from the concurrent operation of four converter stations within agricultural fields to the south of the Wilton Complex. These will be of a low magnitude, affecting an industrial landscape of low sensitivity, giving rise to negligible cumulative impacts overall.

5.14.25 The presence of the two developments will therefore not alter the perception of landscape character locally around the developments, and beyond this will have little or no impact on wider landscape character. Localised sequential visual impacts will not be experienced from the wider landscape, due to the separation of the two projects and the presence of intervening blocks of woodland.

Cumulative visual impacts

5.14.26 In order to inform the assessment cumulative visual impacts, a preliminary Zone of Theoretical Visibility (ZTV) based on indicative information on the location and size of the converter stations was prepared. The ZTV was overlaid with that of the Dogger Bank Teesside A & B converter stations to provide an indication of areas from which Dogger Bank Teesside C & D will potentially be visible. These ZTVs together with field work undertaken allowed the following observations to be made.

5.14.27 The areas from which both Dogger Bank Teesside A & B and Dogger Bank Teesside C & D converter stations will be visible are very limited. There will be combined visibility of the converter stations of the two projects within elevated areas to the south, including:

- Viewpoint 4: Lazenby Bank; and
- Viewpoint 7: Eston Nab and an area at the northern edge of the Eston Hills.

5.14.28 The additional cumulative visual change experienced by recreational receptors at these vantage points will be negligible, given the extensive industrialised context of the surrounding landscape to the north.

5.14.29 There will be no combined visibility of the Dogger Bank Teesside A & B converter stations and Dogger Bank Teesside C & D from the following viewpoints due to the presence of intervening vegetation and buildings:

- Viewpoint 1: Lazenby, northern edge;
- Viewpoint 2: Pasture Lane, north Lazenby;
- Viewpoint 5: A1042, southwest of Kirkleatham (Dogger Bank Teesside C & D is likely to be visible at close range from this viewpoint, but will screen Dogger Bank Teesside A and B); and
- Viewpoint 6: South Lackenby.

5.14.30 There are no predicted impacts arising from Dogger Bank Teesside C & D on travelling receptors on the A174, A1053 and A1042 due to limited visibility of the converter stations. Additional cumulative impacts are therefore not predicted, as no sequential views of the two projects will be available for travelling receptors on these routes.

5.14.31 There will be no additional cumulative impacts on residential receptors within Lazenby, as the Dogger Bank Teesside C & D converter stations will be screened by woodland to the east of the Dogger Bank Teesside A & B site and the Wilton Centre. Similarly, the Dogger Bank Teesside C & D converter stations will not be visible from Lackenby and therefore **no cumulative impacts** are predicted on residential receptors.

5.15 Socio-economics

5.15.1 This section describes the CIA for socio-economics, taking into consideration other onshore and offshore plans, projects and activities. **Table 5.14** provides details of the other projects and plans considered relevant to the socio-economic impact assessment.

Table 5.14 Projects considered within the socio-economic cumulative impact assessment

Type of project	Title	Expected construction date	Taken forward for cumulative impact assessment?
Offshore wind farm	Dogger Bank Creyke Beck A	Construction may start from 2016	Yes
Offshore wind farm	Dogger Bank Creyke Beck B	Construction may start from 2016	Yes
Offshore wind farm	Dogger Bank Teesside C	Construction may start from 2018	Yes
Offshore wind farm	Dogger Bank Teesside D	Construction may start from 2018	Yes
Offshore wind farm	Hornsea Offshore Wind Farm Project One	From 2015	Yes
Offshore wind farm	East Anglia One	2014/2015	No, given its location offshore it is considered

Type of project	Title	Expected construction date	Taken forward for cumulative impact assessment?
			unlikely that this project will impact the north east regional economy
Energy infrastructure	Tees Renewable Energy Plant	2013-2015	Yes
Pipeline	York Potash Project	unknown	Yes
Infrastructure construction	Anemometry mast installation	No later than 2014	Yes
Transport infrastructure	Northern Gateway Terminal	unknown	Yes
Pipeline	Breagh Pipeline	No later than 2015	Yes
Energy infrastructure	Teesside Power Station	unknown	Yes
Infrastructure construction	Potash processing plant	unknown	Yes

5.15.2 Whilst detailed consideration of the effects of the proposed Dogger Bank Teesside A & B projects on the offshore wind supply chain and capital investment within the industry is beyond the scope of the EIA, the development construction and operation of Dogger Bank Teesside A & B will encourage the advancement of production capability in the industry, therefore supporting the development of future offshore wind farm projects and the national and regional economies.

5.15.3 Operating in a competitive market, new infrastructure required for one wind farm could be made available for other wind farms. This would have the effect of reducing the costs and timescales of future projects, enabling a more efficient development programme. Additionally, the continued expansion of the UK offshore wind industry should result in a more UK-focussed supply chain and pool of expertise.

5.15.4 The construction and operation of Dogger Bank Teesside A & B will support regional economic growth by providing demand for wind farm components, encouraging the development of productive capital and providing experience (developing human capital) for those employed in its development, construction and operation. The project will, therefore, contribute to the continued development of the offshore wind industry in the North East region. Further details on the beneficial impacts of Dogger Bank Teesside A & B can be found in **Chapter 22 Socio-Economics**.

5.15.5 The local and regional economy is also expected to benefit from the construction and operation of Dogger Bank Teesside C & D. These are two further offshore wind farm developments within the Dogger Bank Zone, located in Tranche C and to the north of Dogger Bank Creyke Beck and Dogger Bank Teesside A & B. The export cable corridor for Dogger Bank Teesside C & D will come ashore in the same location as Dogger Bank Teesside A & B.

5.15.6 In addition, Dogger Bank Creyke Beck A & B and Hornsea Offshore Wind farm Project One are further Round 3 wind farms proposed off the east coast of England and would also be expected to generate a significant level of job

creation and expenditure during both construction and operation. There is the potential that these projects could also be based in the North East region and would offer further job opportunities and associated project expenditure. As such, potential **beneficial cumulative impacts** are possible for the regional economy as well as direct and indirect employment, should these major wind farm projects be based within the North East region.

5.16 Tourism and recreation

5.16.1 This section describes the onshore and offshore CIA for Tourism and Recreation.

Onshore

5.16.2 A screening exercise was undertaken of the plans, projects and activities (shown in **Table 4.3, Chapter 23 Tourism and Recreation**) to determine their potential to result in cumulative impacts.

5.16.3 The onshore plans, projects and activities with potential to result in cumulative impacts on onshore tourism and recreation are:

- York Potash Project;
- Demolition of various buildings at Kirkleatham Hall School;
- Erection of 6 dwellings in Redcar;
- Teesside Power station;
- Erection of commercial buildings (SABIC UK Petrochemicals);
- Dogger Bank Teesside C & D; and
- Elring Klinger (GB) Ltd Extension to factory.

5.16.4 The onshore impacts identified during the construction, operation and decommissioning phases of Dogger Bank Teesside A & B that could result in cumulative impacts are:

Construction

- Onshore tourist destinations of medium and low sensitivity – **minor residual** impact;
- National Cycle Network (Cycle Route 1) and proposed England Coast Path National Trail – **minor residual** impact (reduced amenity due to the requirement for temporary diversion / temporary closure during construction);
- Public Rights of Way (PRoWs) – **minor residual** impact (reduced amenity due to the requirement for temporary diversions / temporary closures during construction); and
- Local beaches – **minor residual** impact (reduced amenity due to the requirement for temporary diversions during construction).

York Potash Project

5.16.5 This project will be submitted to the Planning Inspectorate in the third quarter of 2014. The pipeline will cross the Dogger Bank Teesside A & B cable route. However, further information on the definite construction schedule for the pipeline is not available. An assumption can be made that typically, it takes between 12-18 months following submission for consent to be granted. Therefore, there is the potential for the construction phase to overlap with Dogger Bank Teesside A & B.

5.16.6 The pipeline will cross two PRoW within the study area and the Kirkleatham Owl Centre and Kirkleatham Museum are also likely to be affected by disturbance and construction traffic since they are located near to the pipeline crossing and onshore cable route.

5.16.7 Mitigation for the PRoW for the York Potash Project is likely to include similar measures to those proposed for Dogger Bank Teesside A & B i.e. consultation and temporary diversion (if required) and therefore **no cumulative impact** is anticipated.

5.16.8 Mitigation for the Kirkleatham Owl Centre and Kirkleatham Museum is also likely to include consultation and minimising lane closures (if required), however a cumulative impact may remain on both receptors from traffic and disturbance.

Demolition of various buildings at Kirkleatham Hall School

5.16.9 There is the potential for the construction phases of the projects to overlap since construction is anticipated to take place between 2013 and 2016. However due to the distance of the demolition from Dogger Bank Teesside A & B, **no cumulative impacts** with receptors identified within this chapter are anticipated.

Erection of six dwellings in Redcar

5.16.10 Construction of the six dwellings will be undertaken between 2013 and 2016, therefore there is the potential for the construction phase to overlap with Dogger Bank Teesside A & B. The project is located just less than 1km north of the cable corridor and therefore it is very unlikely that there will be cumulative impacts with the receptors identified within this chapter.

Teesside Power station

5.16.11 Detailed project information about the exhaust stack demolition is not currently known. The project is 1km away from Dogger Bank Teesside A & B and the works at the power station are likely to be contained within the site itself. Therefore, it is considered very unlikely for works to have a cumulative impact with the receptors identified within this chapter.

Erection of commercial buildings (SABIC UK Petrochemicals)

5.16.12 This project is located approximately 500m north of the onshore cable route, and construction is anticipated between 2012 and 2015. Therefore, there may be a small overlap in construction times. It is considered very unlikely for works to have a cumulative impact with the receptors identified within the chapter.

Dogger Bank Teesside C & D

5.16.13 The potential cumulative impacts of the project are considered to be the same as those identified for Dogger Bank Teesside A & B. The anticipated effects from the Dogger Bank Teesside C & D are effects to the visual amenity, noise, traffic-related construction effects, temporary closure and diversion of PRoWs. In addition, there would be direct impacts on the Redcar Rugby Union Football Club grounds. Through consultation, the main sports grounds have been avoided and the route has been selected to run through the unused area of the grounds, at the southernmost area of the site. A section of temporary beach closure may also be required at the landfall location (Millclose Howle).

5.16.14 As a worst case scenario, should all four Dogger Bank Teesside projects be constructed at the same time, it would result in an increase in magnitude of impacts already identified. Mitigation for receptors identified would be similar as for Dogger Bank Teesside A & B e.g. consultation, minimising any temporary road closures, determining PRoW strategy in advance of works, minimisation of working areas, reinstatement of features on completion of the works. In addition, it may be possible to phase the construction works wherever possible to reduce the impacts. Overall, whilst the implementation of mitigation will reduce the impact on tourism and recreation receptors, a cumulative impact is likely to remain.

Elring Klinger (GB) Ltd Extension to factory

5.16.15 This project is located just less than 700m north of the cable route and involves the extension of an existing factory building with ancillary new access roads. Works will be undertaken between 2013 and 2016 and therefore, the construction phases may overlap. However due to the distance of the works from Dogger Bank Teesside A & B and the scale of the works, no cumulative impacts with receptors identified within this chapter are anticipated.

Offshore

5.16.16 Due to the large number of other plans, projects and activities that must be considered in the offshore environment, two screening exercises have been undertaken in order to arrive at an informed, defensible and reasonable ‘short list’ to take forward in the assessment.

5.16.17 The first step in the CIA for offshore tourism and recreation involved an appraisal of the key impacts relevant to each of the receptors that have been identified (**Table 5.15**). For each impact, the potential for impacts to occur on a cumulative basis has been identified, both within and beyond the Dogger Bank Zone; the confidence in the data and information available to inform the CIA has been appraised (following the methodology set out in **Chapter 4**); and the other activities that could contribute to these impacts has been identified.

5.16.18 This also identifies where cumulative impacts are not anticipated, thereby screening them out from further assessment.

For offshore tourism and recreation, the potential for cumulative impacts is identified in relation to: diving and watersport; recreational angling; and wildlife tours (**Table 5.15**). However, it has been determined that cumulative impacts

on these receptors are not expected to manifest outside, or beyond 1km from, the Dogger Bank Zone and Dogger Bank Teesside A & B Export Cable Corridor. In all cases, data confidence is assessed as medium. On this basis, the potential for any other cumulative impacts is screened out from further consideration in the process.

Table 5.15 Potential cumulative impacts on tourism and recreation

Impacts	Dogger Bank Zone (within 1km)		Beyond 1km from the Dogger Bank Zone		Rationale for where no cumulative impacts are expected
	Potential for cumulative impacts	Data confidence	Potential for cumulative impacts	Data confidence	
Impact on diving and watersport (inshore/coastal and offshore)	Yes	Medium	No	N/A	No cumulative impact is anticipated outside the Dogger Bank Zone due to the scale and nature of the impacts assessed for Dogger Bank Teesside A & B in its own right (i.e. all impacts are associated with tourism and recreation activities taking place within or close by the project areas and no impacts greater than 'minor adverse' have been identified).
Impact on angling (inshore/coastal and offshore)	Yes	Medium	No	N/A	
Impact on wildlife tours (inshore/coastal and offshore)	Yes	Medium	No	N/A	
Impact on diving and watersport (inshore/coastal and offshore)	Yes	Medium	No	N/A	

5.16.19 Where the first step has indicated the potential for cumulative impacts, the second step in the CIA for offshore tourism and recreation has involved the identification of the actual individual plans, projects and activities within those broad industry levels for inclusion in the CIA. In order to inform this, Forewind has produced a list of plans, projects and activities occurring within a very large study area encompassing the greater North Sea and beyond (referred to as the 'long list', Section 4.2). The long list has been appraised, based on the confidence Forewind has in being able to undertake an assessment from the information and data available, enabling individual plans, projects and activities to be screened in or out.

5.16.20 The plans, projects and activities relevant to offshore tourism and recreation are presented in **Table 5.16** along with the results of the screening exercise that identifies whether it is possible to take each one forward in a detailed cumulative assessment. This considers the confidence in the information available and the distance from Dogger Bank Teesside A & B.

5.16.21 It should be noted that:

- Where Forewind is aware that a plan, project or activity could take place in the future, but has no information on how the plan, project or activity will be executed, it is screened out of the assessment; and
- Existing projects, activities and plans are considered to be a part of the established baseline and are therefore not included in the cumulative assessment.

Table 5.16 Cumulative impact assessment screening for offshore tourism and recreation

Type of project	Project title	Project status	Predicted construction period	Distance from Dogger Bank Teesside A & B	Confidence in project details	Confidence in project data	Carried forward to cumulative impact assessment	Rationale for not carrying into CIA
Offshore wind farm	Dogger Bank Creyke Beck A & B	Pre-Application	Post 2016	Dogger Bank Creyke Beck A approximately 4km Dogger Bank Creyke Beck B approximately 6km	High	High	Yes	N/A
Offshore wind farm	Dogger Bank Teesside C & D	Pre-Application	Post 2017	Approximately 8km	High	Medium	Yes	N/A
Offshore wind farm	Dogger Bank Zone – other future developments	Potential	Not confirmed	Not confirmed	Low	Low	No	Low data confidence
Offshore wind farm	Teesside Offshore Wind farm	Operational	2012 - 2013	Dogger Bank Teesside A: 236km Dogger Bank Teesside B: 198km	High	High	Yes	N/A
Offshore wind farm	Hornsea Project One	Pre-Application	Post 2015	Dogger Bank Teesside A: 116km Dogger Bank Teesside B: 98km	High	Medium	Yes	N/A

Type of project	Project title	Project status	Predicted construction period	Distance from Dogger Bank Teesside A & B	Confidence in project details	Confidence in project data	Carried forward to cumulative impact assessment	Rationale for not carrying into CIA
Offshore wind farm	Hornsea Project Two	Pre-consent	Post 2015	Dogger Bank Teesside A: 113km Dogger Bank Teesside B: 95km	Medium	Medium	Yes	N/A
Oil and Gas	Cygnus gas field development (Alpha and Bravo)	Development (pre-production)	Ongoing – production to start in 2015	Alpha: Dogger Bank Teesside A: 47km Dogger Bank Teesside B: 30km Bravo: Dogger Bank Teesside A: 47km Dogger Bank Teesside B: 27km	Medium	Medium	No	Relative scarcity and low sensitivity of receptors in proximity to this project
Aggregate extraction	Area 466/1	Application area	Decision expected 2014	Dogger Bank Teesside A: 65km Dogger Bank Teesside B: 28km	Medium	Medium	No	As above

5.16.22 The potential offshore impacts identified during the construction, operation and decommissioning phases of Dogger Bank Teesside A & B (Sections 6 to 8, **Chapter 23**) that could result in cumulative impacts are:

- Impacts on diving activity from reduced visibility due to sediment disturbance; and
- Impacts on diving, watersport, recreational angling and wildlife tours from general disruption by project activities.

5.16.23 It has been established through the CIA screening process for tourism and recreation that cumulative impacts are not expected to manifest beyond approximately 1km from the Dogger Bank Zone and Dogger Bank Teesside A & B Export Cable Corridor. This is on account of the scale and nature of the impacts assessed for Dogger Bank Teesside A & B in its own right (no residual impacts greater than 'minor' have been identified).

5.16.24 The potential for cumulative impacts to arise on the offshore tourism and recreation receptors that have been described in this assessment is therefore extremely limited. Potential impacts from other offshore wind farms scoped into the assessment (Dogger Bank Creyke Beck A & B, Dogger Bank Teesside C & D, Teesside Offshore Wind farm and Hornsea Projects One and Two) are anticipated to be the same or similar to those set out in this assessment, and therefore to be limited to within the near vicinity (approximately 1km) of those activities. As such, they are not anticipated to overlap with any of the potential impacts described for Dogger Bank Teesside A & B.

5.16.25 As a result, the cumulative impact on offshore tourism and recreation during all phases is anticipated to be no greater than that assessed for Dogger Bank Teesside A & B on its own (**negligible** to **minor adverse**).

5.17 Geology, water resources and land quality

5.17.1 This section describes the CIA for Geology, Water Resources and Land Quality.

5.17.2 A screening exercise was undertaken to identify whether there is sufficient confidence in the project details to take these forward to the assessment. Flood risk with respect to the Dogger Bank Teesside A & B schemes relates only to surface water runoff. As runoff associated with each development site is restricted to the greenfield runoff rate identified for the existing undeveloped site, cumulative impact has not been considered further.

5.17.3 The onshore impacts identified during the construction of Dogger Bank Teesside A & B that could result in cumulative impacts are:

- Impact of spills and disturbance to water courses effecting water quality may have a **minor adverse** impact;
- Impact of spills to shallow topsoil effecting land quality may have a **minor adverse** impact; and
- Generation of waste arising that may need to removed, including some destined to be disposed at landfill resulting in a temporary **minor adverse impact**.

5.17.4 Given the nature of the impacts discussed within this chapter, only similar projects (e.g. large scale development or buried linear developments) are likely to result in cumulative impacts. Given this, the five projects of consideration here are the Tees Renewable Energy Plant underground cable, York Potash Project, Dogger Bank Teesside C & D, the demolition of the Teesside Power Station and the Scoping request for two onshore wind turbines.

Tees Renewable Energy Plant Underground Cable

5.17.5 The proposed plant will enter into commercial operation in 2015 and therefore the construction programme of the cable connection for the biomass power plant is likely to overlap with the construction Dogger Bank Teesside A & B, based on current knowledge of the schemes. The potential impacts of the underground cable are considered to be similar to those identified within **Chapter 24**. These worst case scenarios are summarised below in **Table 5.17** and the likely cumulative impact assessed.

Table 5.17 Summary of Cumulative Impacts – Tees Renewable Energy Plant Underground Cable

Impact	Realistic worst case scenario	Cumulative impact
Construction		
Impacts related to geology, hydrology and water resources	Both Dogger Bank Teesside A & B and the Tees Renewable Energy Plant Underground Cable constructed concurrently	If mitigation measures detailed in this chapter are applied to both projects the residual impacts identified are not anticipated to change.
Waste	Both Dogger Bank Teesside A & B and the Tees Renewable Energy Plant Underground Cable constructed concurrently	If the projects are constructed concurrently, this will increase the total waste arisings, thereby causing an increased **adverse** impact. However, by following the construction stage mitigation measures provided in **Chapter 24**, there remains a temporary **minor adverse** residual cumulative impact, using the assessment criteria provided in **Chapter 24**. The assessment identified a range of waste management facilities in the area to accept wastes generated.
Flood Risk	Negligible impact	None
Operation		
All impacts	Negligible Impacts	None
Decommissioning		
All impacts	As construction phase	None

York Potash Project

5.17.6 The worst case scenario will be the construction of the York Potash Project and the Dogger Bank Teesside A &/or B onshore cable route at the same time. This will have to consider the logistical aspects of the point where both routes cross. The construction activities for the pipeline are likely to generate significant quantities of excavated material, like the cable route for Dogger Bank Teesside A & B. If this is the case there is likely to be a cumulative **minor adverse** impact as both will be seeking to identify suitable off-site waste management options (including landfill) for surplus excavated material at the same time, thus increasing the cumulative amount of waste requiring suitable management options. The potential impacts of the York Potash Project are considered to be similar to those identified within **Chapter 24**. These worst case scenarios are summarised below in **Table 5.18** and the likely cumulative impact assessed.

Table 5.18 Summary of Cumulative Impacts – York Potash Project

Impact	Realistic worst case scenario	Cumulative impact
Construction		
Impacts related to geology, hydrology and water resources	Both Dogger Bank Teesside A & B and the York Potash Project constructed concurrently	If mitigation measures detailed in **Chapter 24** are applied to both projects the residual impacts identified are not anticipated to change.
Waste	Both Dogger Bank Teesside A & B and the York Potash Project constructed concurrently	If the projects are constructed concurrently, this will increase the total waste arisings, thereby causing an increased adverse impact. However, by following the construction stage mitigation measures provided in **Chapter 24**, there remains a temporary **minor adverse** residual cumulative impact, using the assessment criteria provided in **Chapter 24**. The assessment identified a range of waste management facilities in the area to accept wastes generated.
Flood Risk	Negligible impact	None
Operation		
All impacts	Negligible Impacts	None
Decommissioning		
All impacts	As construction phase	None

Dogger Bank Teesside C & D

5.17.7 The potential impacts of the Dogger Bank Teesside C & D are considered to be similar to those identified within **Chapter 24**. The anticipated cumulative impacts with Dogger Bank Teesside C & D are dependent on the timing of the construction phases. The worst case scenario for each impact has been described in **Chapter 24** and depends on whether the construction phase is concurrent or sequential. These worst case scenarios also apply to the construction of Dogger Bank Teesside A & B project and Teesside C & D project either concurrently or sequentially. These worst case scenarios are summarised in **Table 5.19** and the likely cumulative impact assessed.

Table 5.19 Summary of Cumulative Impacts – Dogger Bank Teesside C & D

Impact	Realistic worst case scenario	Cumulative Impact
Construction		
Impacts related to geology, hydrology and water resources	Both Dogger Bank Teesside A & B, Teesside C & D constructed concurrently	If mitigation measures detailed in **Chapter 24** are applied to both projects the residual impacts identified are not anticipated to change.
Waste	Both Dogger Bank Teesside A & B, Teesside C & D constructed concurrently	If the projects are constructed concurrently, this will increase the total waste arisings, thereby causing an increased adverse impact. However, by following the construction stage mitigation measures provided in **Chapter 24**, there remains a temporary **minor adverse** residual cumulative impact, using the assessment criteria provided in **Chapter 24**. The assessment identified a range of waste management facilities in the area to accept wastes generated.
Flood Risk	Negligible impact	None
Operation		
All impacts	Negligible Impacts	None
Decommissioning		
All impacts	As construction phase	None

Teesside Power Station

5.17.8 This project includes the demolition of eight off heat recovery system generator exhaust stacks and is located off the A1053, Greystone Road. Planning permission is not required for this project and it is therefore not considered likely that the works will have a cumulative impact on any of the receptors identified within this chapter. The worst case scenarios are summarised below in **Table 5.20** and the likely cumulative impact assessed.

Table 5.20 Summary of cumulative impacts – Teesside Power Station

Impact	Realistic worst case scenario	Cumulative Impact
Construction		
Impacts related to geology, hydrology and water resources	Both Dogger Bank Teesside A & B, and Teesside Power Station demolition occurring concurrently	If mitigation measures detailed in **Chapter 24** are applied to both projects the residual impacts identified are not anticipated to change.
Waste	Both Dogger Bank Teesside A & B, and Teesside Power Station demolition occurring concurrently	If the projects are constructed concurrently, this will increase the total waste arisings, thereby causing an increased adverse impact. However, by following the construction stage mitigation measures provided in **Chapter 24**, there remains a temporary **minor adverse** residual cumulative impact, using the assessment criteria provided in **Chapter 24**. The assessment identified a range of waste management facilities in the area to accept wastes generated.
Flood Risk	Negligible impact	None
Operation		
All impacts	Negligible Impacts	None
Decommissioning		
All impacts	As construction phase	None

Scoping Request for two wind turbines

5.17.9 The potential types of impacts of two turbines are considered to be similar to those identified within **Chapter 24**. The anticipated cumulative impacts with turbine project are dependent on the timing of the construction phases. The worst case scenario for each impact has been described in **Chapter 24** and depends on whether the construction phase is concurrent or sequential. These worst case scenarios also apply to the construction of Dogger Bank Teesside A & B and the turbine project either concurrently or sequentially. These worst case scenarios are summarised below and the likely cumulative impact assessed.

Table 5.21 Summary of cumulative impacts – Turbine Project

Impact	Realistic worst case scenario	Cumulative impact
Construction		
Impacts related to geology, hydrology and water resources	Both Dogger Bank Teesside A & B, and Turbine Project constructed concurrently	If mitigation measures detailed in **Chapter 24** are applied to both projects the residual impacts identified are not anticipated to change.
Waste	Both Dogger Bank Teesside A & B, and Turbine Project constructed concurrently	If the projects are constructed concurrently, this will increase the total waste arisings, thereby causing an increased **adverse impact**. However, by following the construction stage mitigation measures provided in **Chapter 24**, there remains a **temporary minor adverse** residual cumulative impact, using the assessment criteria provided in **Chapter 24**. The assessment identified a range of waste management facilities in the area to accept wastes generated.
Flood Risk	Negligible impact	None
Operation		
All impacts	Negligible Impacts	None
Decommissioning		
All impacts	As construction phase	None

5.17.10 There is potential for the projects Dogger Bank Teesside A & B, Dogger Bank Teesside C & D, the York Potash Project, the Tees Renewable Energy Plant Underground Cable, the demolition of the Teesside Power Station and the Wind Turbines project to be constructed at the same time. During the construction phase, the six projects are likely to generate a large volume of excavated materials. It is anticipated that the majority of excavated material could be reused onsite (particularly in relation to the Dogger Bank Teesside A & B, Dogger Bank Teesside C & D projects); however some of this material from all projects is predicted to require removal from the sites for off-site disposal. Cumulatively, this could have a greater negative impact on the local waste management facilities that accept these types of waste for reuse, recycling or disposal, than any single project in isolation. However, it is not possible to predict the overall significance given the lack of information about the York Potash Project.

5.18 Terrestrial ecology

5.18.1 This section describes the CIA for terrestrial ecology. Those plans, projects and activities which have the potential to result in cumulative impacts are provided below:

- Tees Renewable Energy Plant Underground Cable;
- York Potash Project;

- Dogger Bank Teesside C & D;
- Teesside Power Station;
- Scoping Request for two wind turbines;
- Installation of a single turbine (Cirrus Energy);
- Teesside Power Station: demolition of a power station; and
- Elring Klinger: Erection of a single wind turbine.

Tees Renewable Energy Plant Underground Cable

5.18.2 Where the Tees Renewable Energy Plant Underground Cable runs down the western side of the Wilton Complex it enters the far western end of the Dogger Bank Teesside A & B study area. This would result in a minor increase in hedgerow loss and associated impacts on breeding birds and bats.

Hedgerows – loss of hedgerows

5.18.3 Mitigation for Dogger Bank Teesside A & B is shown in **Chapter 25**. Post-mitigation impacts of a single project are **negligible** and of two projects built concurrently or sequentially, **minor adverse**. In the longer term, replacing species poor hedgerows with species rich planting will lead to **minor beneficial** impacts under both scenarios. Assuming Tees Renewable Energy Plant Underground Cable adopt similar mitigation to Dogger Bank Teesside A & B, no additional mitigation would be required and overall no additional cumulative impact is anticipated.

Breeding birds – damage or destruction of birds' nests and disturbance

5.18.4 The additional minor loss of hedgerow would result in additional habitat loss for breeding birds and construction disturbance in an area of low value for breeding birds.

5.18.5 Mitigation for Dogger Bank Teesside A & B is shown in **Chapter 25**. Post-mitigation impacts of single project are **negligible** and of two projects built sequentially, **minor adverse**.

5.18.6 It can be assumed that Tees Renewable Energy Plant Underground Cable will adopt similar mitigation measures to Dogger Bank Teesside A & B (**Chapter 25**), due to the legal protection afforded to nesting birds. Therefore, no additional mitigation would be required and overall, no additional cumulative impact is predicted.

Bats – habitat loss and fragmentation and disturbance.

5.18.7 Mitigation for Dogger Bank Teesside A & B is shown in **Chapter 25**. Post-mitigation impacts of single project are **negligible** and of two projects built sequentially, **minor adverse**.

5.18.8 The mitigation measures proposed (**Chapter 25**) are to ensure the project follows best practice guidelines and that the project is legally compliant. Assuming that the Tees Renewable Energy Plant Underground Cable project team will take similar steps, then no additional mitigation would be required and overall no additional cumulative impact is anticipated.

York Potash Project

5.18.9 There is the potential for the construction phase of the York Potash Project to overlap with Dogger Bank Teesside A & B.

5.18.10 The only potential receptors initially identified as potentially being cumulatively effected during the construction of the project pipeline are hedgerows and the associated breeding birds and bats.

Hedgerows - temporary loss of hedgerows

5.18.11 Where the York Potash Project pipeline crosses the Dogger Bank Teesside A & B study area, there would potentially be a significant increase in the degree of hedgerow loss.

5.18.12 Key mitigation for Dogger Bank Teesside A & B is hedgerow re-planting (**Chapter 25**). In the short term, post-mitigation impacts of single project are **negligible** and of two projects built concurrently or sequentially, **minor adverse**. In the longer term, replacing species poor hedgerows with species each planting will lead to **minor beneficial** impacts under both scenarios. It is assumed that York Potash Project would follow best practice guidelines and adopt similar mitigation to **Chapter 25**. Therefore no additional mitigation would be required, and overall no additional cumulative impact is anticipated.

Breeding birds – damage or destruction of birds' nests and disturbance

5.18.13 Where the York Potash Project pipeline crosses the Dogger Bank Teesside A & B study area, there would potentially be a significant increase in the degree of hedgerow loss and construction disturbance.

5.18.14 Mitigation for Dogger Bank Teesside A & B is shown in **Chapter 25**. Post-mitigation impacts of single project are **negligible** and of two projects built sequentially, **minor adverse**.

5.18.15 It can be assumed that York Potash Project will adopt similar mitigation measures to Dogger Bank Teesside A & B (**Chapter 25**), due to the legal protection afforded to nesting birds. Therefore no additional mitigation would be required, and overall no additional cumulative impact is anticipated.

Bats – habitat loss and fragmentation and disturbance

5.18.16 Where the York Potash Project crosses the Dogger Bank Teesside A & B study area, there would potentially be a significant increase in the degree of hedgerow loss and construction disturbance which could impact on foraging and commuting bats.

5.18.17 Mitigation for Dogger Bank Teesside A & B is shown in **Chapter 25**. Post mitigation impacts of single project are **negligible** and of two projects built sequentially, **minor adverse**.

5.18.18 The mitigation measures proposed (**Chapter 25**) are to ensure the project follows best practice guidelines and that the project is legally compliant. Assuming that the York Potash Project will take similar steps, then no additional mitigation would be required and overall no additional cumulative impact is anticipated.

Dogger Bank Teesside C & D

5.18.19 The potential receptors of Dogger Bank Teesside C & D are considered to be the same as those identified for Dogger Bank Teesside A & B. The anticipated effects from the Dogger Bank Teesside C & D are effects to the Redcar to Saltburn Coast Local Wildlife Site (LWS), hedgerows, wintering birds, breeding birds, and bats.

5.18.20 As a worst case scenario, should Dogger Bank Teesside A & B and Dogger Bank Teesside C & D all be constructed at the same time, it would result in an increase in magnitude of impacts already identified in **Chapter 25**. Mitigation for receptors identified would be similar as for Dogger Bank Teesside A & B, e.g. consultation, undertaking construction works outside of sensitive times, minimisation of working areas, and reinstatement of features on completion of the works. In addition, it may be possible to phase the construction works wherever possible to reduce the impacts. Overall, whilst the implementation of mitigation will reduce the impact on terrestrial ecological receptors, a cumulative impact is likely to remain on receptors.

Redcar to Saltburn Coast LWS – habitat damage or loss

5.18.21 Two landfalls would be required within the LWS, essentially doubling the level of impact.

5.18.22 Mitigation for Dogger Bank Teesside A & B is given in **Chapter 25**. Although all four projects together would result in a doubling of the level of impact, assuming similar mitigation for Dogger Bank Teesside C & D, there should be no requirement for further mitigation and no additional cumulative impact.

Hedgerows - temporary loss of hedgerows

5.18.23 The temporary loss of hedgerows will represent a loss of habitat for numerous species, and in particular may cause impacts upon breeding birds and bats within the Dogger Bank Teesside A & B study area. There would potentially be a significant increase in the degree of hedgerow loss.

5.18.24 Key mitigation for Dogger Bank Teesside A & B is hedgerow re-planting (**Chapter 25**). In the short term, post-mitigation impacts of single project are negligible and of two projects built concurrently, **minor adverse**. In the longer term, replacing species poor hedgerows with species each planting will lead to **minor beneficial** impacts under both scenarios. Assuming similar mitigation to **Chapter 25**, is implemented for Dogger Bank Teesside C & D, no additional mitigation would be required and therefore no additional cumulative impact.

Wintering birds

5.18.25 The key area for both Dogger Bank Teesside A & B and Dogger Bank Teesside C & D is the arable fields near the landfall. Primarily, the level of impact would be doubled by having four projects compared with two. Cumulative impacts are predicted depending on timings and project specifics. It is understood that it is unlikely that all four projects will be built concurrently, and that sequential build scenarios are more likely.

5.18.26 **Chapter 25** shows mitigation for wintering birds for Dogger Bank Teesside A & B. As a minimum, similar mitigation will be required for Dogger Bank Teesside

C & D. For either Dogger Bank A & B or Dogger Bank C & D on its own, this would result in **minor adverse** post-mitigation impacts. However this relies on the possibility of displacing wintering birds to other parts of the arable field. With both Dogger Bank Teesside A & B and Dogger Bank C & D being built at either end of the field, there is the potential for an increased magnitude of effect. Thus additional mitigation will be required.

5.18.27 A construction coordination plan for the projects will be required, to include detailed consideration of how best to minimise impacts on wintering birds. As a preliminary illustrative example, works on Dogger Bank Teesside A & B might take place in September and October, November and December might be avoided, and works on Dogger Bank Teesside C & D take place in January and February.

5.18.28 Mitigation for Dogger Bank Teesside A & B is shown in **Chapter 25**. Impacts of single project are **negligible** and of two projects built sequentially, **minor adverse**.

Bats – habitat loss and fragmentation and disturbance

5.18.29 Along the HVDC routes, the combined projects (Dogger Bank Teesside A & B and Dogger Bank Teesside C & D), would result in a significant increase in the degree of hedgerow loss and construction disturbance, as the working width would be doubled, resulting in hedgerow gaps of 72m (four projects) instead of 36m (two projects).

5.18.30 Additional mitigation would be required in the form of introducing semi-mature, plant grown shrubs in small clusters, within the hedgerow re-planting. This would reduce the functional length of gaps more quickly, and maintain the overall level of impact as **minor adverse**.

Teesside Power Station

5.18.31 This project includes the demolition of eight off heat recovery system generator exhaust stacks and is located off the A1053, Greystone Road. Planning permission is not required for this project and the following comment was made on the planning application :

5.18.32 *"The exhaust stacks to be demolished are located within a predominately industrial area. It is not considered the demolition of the exhaust stacks and retention of the other equipment on the site will have not a significantly detrimental effect on the surrounding area. The proposed method of demolition and restoration of the site is considered to be acceptable. Prior Approval of the Local Planning Authority is not therefore required".*

5.18.33 It is therefore not considered likely that the works will have a cumulative impact on any of the receptors identified within **Chapter 25.**

Scoping request for two wind turbines

5.18.34 This project involves the installation of two wind turbines within land 680m west of Yearby and 650m north of Wilton.

5.18.35 At this stage, very little project information concerning the construction programme or timing has been made available. Therefore an assumption has

been made that the construction programme will overlap with Dogger Bank Teesside A & B.

5.18.36 The only potential receptors initially identified as potentially being cumulatively effected are hedgerows, breeding birds and bats.

Hedgerows - temporary loss of hedgerows

5.18.37 The scoping envelope overlaps with the cable corridor and on a worst case scenario, assuming this stretch of hedgerow requires removal, it would result in a minor increase in the length of hedgerow lost.

5.18.38 Key mitigation for Dogger Bank Teesside A & B is hedgerow re-planting (**Chapter 25**). In the short term, post-mitigation impacts of single project are **negligible** and of two projects built concurrently or sequentially, **minor adverse**. In the longer term, replacing species poor hedgerows with species each planting will lead to **minor beneficial** impacts under both scenarios. It is assumed that this project would follow best practice guidelines and adopt similar mitigation to hedgerow replanting. Therefore no additional mitigation would be required, and overall no additional cumulative impact is anticipated.

Breeding birds – damage or destruction of birds' nests and disturbance

5.18.39 Where the scoping envelope crosses the Dogger Bank Teesside A & B study area, there would potentially be a significant increase in the degree of hedgerow loss and construction disturbance to nesting birds.

5.18.40 Mitigation for Dogger Bank Teesside A & B is shown in **Chapter 25**. Post mitigation impacts of single project are **negligible** and of two projects built sequentially, **minor adverse**.

5.18.41 It can be assumed that this project will adopt similar mitigation measures to Dogger Bank Teesside A & B (Table 6.5 in **Chapter 25**), due to the legal protection afforded to nesting birds. Therefore no additional mitigation would be required, and overall no additional cumulative impact is anticipated.

Bats – habitat loss, fragmentation, disturbance and collision risk

5.18.42 Within the area close to where the scoping envelope crosses the cable corridor, bats could suffer from foraging and commuting habitat loss, and potentially collision risk with the turbines.

5.18.43 Mitigation for Dogger Bank Teesside A & B is shown in Table 6.3 in **Chapter 25**. Post mitigation impacts of single project are **negligible** and of two projects built sequentially, **minor adverse**.

5.18.44 The mitigation measures proposed (**Chapter 25**) are to ensure the project follows best practice guidelines and that the project is legally compliant. Therefore, assuming that the project adopts similar mitigation measures and best practice guidelines are followed in relation to siting turbines in proximity to hedgerows, then no additional mitigation would be required and overall no additional cumulative impact is anticipated.

Installation of a single turbine (Cirrus Energy)

5.18.45 A single wind turbine is proposed on land approximately 600m south of Turners Arms Farm. A transformer/substation compound including new vehicle access roads would also be required. The construction programme for the project is not currently known and therefore it has been assumed that the construction programme will overlap with Dogger Bank Teesside A & B.

5.18.46 The scoping envelope falls outside the cable corridor, but within the wider study area and therefore the only potential receptor initially identified as potentially being cumulatively effected are bats.

Bats – habitat loss, fragmentation, disturbance and collision risk

5.18.47 Bats within the study area may suffer from a loss of foraging habitat, disturbance from the works and potentially collision with turbines.

5.18.48 The mitigation measures proposed (**Chapter 25**) are to ensure the project follows best practice guidelines and that the project is legally compliant. Therefore, assuming that the project adopts similar mitigation measures and best practice guidelines are followed in relation to siting turbines in proximity to hedgerows, then no additional mitigation would be required and overall no additional cumulative impact is anticipated.

Teesside Power Station: demolition of a power station

5.18.49 At Teesside Power Station, it is proposed for the demolition of the power station and the associated structures and equipment. Planning permission is not required for the scheme and the following comment was made on the planning application website:

"The power station and other associated structures to be demolished are located within a predominately industrial area. It is not considered the demolition will have a significantly detrimental effect on the surrounding area. The proposed method of demolition and restoration of the site is considered to be acceptable. Prior Approval of the Local Planning Authority is not therefore required."

5.18.50 It is therefore not considered likely that the works will have a cumulative impact on any of the receptors identified within **Chapter 25**.

Elring Klinger: Erection of a single wind turbine

5.18.51 Elring Klinger propose to install a single wind turbine (maximum height: 80m) and the associated infrastructure including access tracks, hardstanding, control buildings and cabling. The site is located on land to the west of Kirkleatham Business Park.

5.18.52 The project is at the scoping stage and the scoping envelope falls outside the cable corridor, but within the wider study area and therefore the only potential receptor initially identified as potentially being cumulatively effected are bats.

Bats – habitat loss, fragmentation, disturbance and collision risk

5.18.53 Bats within the study area may suffer from a loss of foraging habitat, disturbance from the works and potentially collision with turbines.

5.18.54 The mitigation measures proposed (**Chapter 25**) are to ensure the project follows best practice guidelines and that the project is legally compliant. Therefore, assuming that the project adopts similar mitigation measures and best practice guidelines are followed in relation to siting turbines in proximity to hedgerows, then no additional mitigation would be required and overall no additional cumulative impact is anticipated.

5.19 Land use and agriculture

5.19.1 A screening assessment was undertaken to identify the projects (**Table 4.3**) taken forward to the assessment. Given the nature of land use and agriculture impacts, only similar projects (large scale buried linear developments) within the same landownership boundaries are likely to result in cumulative impacts. Given this, three projects have been identified with the potential to result in cumulative impacts on land use and agriculture, they are:

- Tees Renewable Energy Plant Underground Cable;
- York Potash Project; and
- Dogger Bank Teesside C & D.

Construction

5.19.2 All three of these projects have the potential to result in similar impacts to those described for Dogger Bank Teesside A & B. The Teesside Renewable Energy Plant Underground Cable is scheduled to begin operation in 2015, therefore the construction phase will not overlap with the Dogger Bank Teesside A & B and as such is not considered further in this section.

5.19.3 Assuming a worst case scenario with all four Dogger Bank Teesside Projects and the York Potash Project being constructed concurrently there is potential increased impact prior to any mitigation being adopted. Each of the projects is considered to contribute equally to the additional cumulative impact.

5.19.4 The following cumulative impacts have been identified are discussed in further detail below:

- Land taken out of existing use;
- Degradation of soils;
- Impacts on land drainage systems; and
- Disturbance and nuisance.

Land taken out of existing use

5.19.5 As described for Dogger Bank Teesside A & B, due to health, safety and technical requirements, during construction, works areas will be fenced off and not accessible to landowners, occupiers or the public for the duration of the construction period, this is considered to apply to all three of the projects.

5.19.6 There is also increased potential for areas of land to become isolated or inaccessible during construction, this is of added importance where multiple projects are being constructed concurrently.

5.19.7 The greatest impact in terms of land taken out of existing use will occur where the York Potash Project crosses Dogger Bank Teesside A & B and Dogger Bank Teesside C & D. This impact will be experienced by a single landowner. This is currently used for agricultural production and likely that at least one field will not be available at all during the construction period.

Degradation of soils

5.19.8 As described in **Chapter 26**, construction activities associated with each of the projects have the potential to result in degradation of soils.

5.19.9 There is the potential for soils to be compacted and soil structure to deteriorate especially along access routes, haul roads and where heavy materials or equipment is stored. The effect of all of these impacts is usually reduced fertility and crop yields.

5.19.10 In locations where soils may be impacted by multiple projects, for example shared access locations or lay-down areas the effects of soil compaction are likely to be greater in magnitude than for an individual project.

Impacts on land drainage systems

5.19.11 During construction of each of the projects some temporary impacts on land drainage within agricultural fields will be unavoidable. It will be necessary to truncate drainage systems temporarily during excavation and installation and re-instate following construction.

5.19.12 This impact is considered to be considerably greater than for the individual projects. As per the sequential Dogger Bank Teesside A & B projects, land drains will need to be removed from the construction working width for each project prior to construction and reinstated following completion. Subsequently the adjacent section will be removed prior to construction of the next project and reinstated after completion.

Disturbance and nuisance

5.19.13 As well as the direct impacts on land use and agriculture, there is the potential to cause disturbance and nuisance to landowners and occupiers during the construction stage as described in **Chapter 26**. This will be the physical presence of workers on their land, issues regarding safety and security and the concerns that this may cause. If multiple projects are constructed concurrently the magnitude of these effects will be greater.

Impacts

5.19.14 **Table 5.22** provides an assessment of the cumulative impact associated with a combined construction phase of Dogger Bank Teesside A & B, Tees Renewable Energy Plant Underground Cable; York Potash Project and Dogger Bank Teesside C & D for the impacts described above.

Table 5.22 Potential cumulative construction impacts on land use and agriculture

Description of Impact	Impact of Dogger Bank Teesside A & B constructed in isolation	Cumulative impact should projects be constructed concurrently	Residual cumulative impact should projects be constructed concurrently
Land taken out of existing use	**Minor adverse**	**Moderate adverse**	**Minor adverse**
Degradation of soils	**Minor adverse**	**Moderate adverse**	**Moderate adverse**
Impacts on land drainage systems	**Minor adverse**	**Moderate adverse**	**Minor adverse**
Disturbance and nuisance	**Minor adverse**	**Moderate adverse**	**Minor adverse**

5.19.15 Due to the identification of these additional cumulative impacts on land use and agriculture the mitigation measures in **Table 5.23** have been proposed. This assumes the cumulative projects identified above will employ similar mitigation measures to those proposed above for Dogger Bank Teesside A & B in addition to those is **Table 5.23**.

Table 5.23 Cumulative impact – mitigation measures

Mitigation measures
• Careful construction programming between the various projects to ensure impacts are minimised; • Best practice construction practices as outlined above for Dogger Bank Teesside A & B are employed for all projects; • The construction footprint will be minimised where possible and land reinstated to its former condition as soon as reasonably possible following cable installation, dependent on weather conditions; • On-going dialogue and resolution of any issues between the different projects during construction; • HDD to be utilised by the future developers and operators of the development at crossing point of York Potash Project pipeline and construction compound; • Following completion of construction associated with all projects soils will be reinstated and if necessary further remediated to allow agricultural activities to continue; • Following completion of construction associated with all projects drainage will be reinstated in a combined manner for entire fields if deemed necessary to their former condition and functioning to allow existing agricultural activities to continue; • Access for farm vehicles, to land severed by the works, will be maintained where practicable in combined consultation with individual landowners and occupiers, and where necessary, crossing points will be agreed pre-construction; • Working method statements to be prepared and shared in relation to soil reinstatement, access, drainage, construction compounds and crossing agreements; and • Negotiations and dialogue with current landowners to secure the permanent land take with compensation forming part of those private treaty discussions.

5.19.16 Following implementation of these measures the cumulative impact of Dogger Bank Teesside A & B will be no greater than the impact for each individual project with the exception of localised soil degradation. The residual impacts are shown in **Table 5.23**.

Operation

5.19.17 No cumulative operational impacts per project, greater than those experienced for Dogger Bank Teesside A & B in isolation have been identified.

Decommissioning

5.19.18 Similar to the cumulative construction impacts discussed above should multiple projects be decommissioned at the same time there is potential for greater cumulative impacts to occur. These will result in a similar additional cumulative impact to that experienced during construction.

5.19.19 The cumulative impact arising from decommissioning, including the cable route and the converter stations will form part of an overall Decommissioning Plan for the Dogger Bank Teesside A & B projects, for which a full EIA will be carried out ahead of any decommissioning works being undertaken.

5.20 Terrestrial archaeology

5.20.1 For a cumulative impact to arise as a result of impacts during construction to buried heritage assets, a proposed development would have to share a boundary with Dogger Bank Teesside A & B and could therefore potentially impact the same buried archaeological resource during construction.

5.20.2 Cumulative impacts during operation can arise where the above ground built elements of a proposed development, when viewed alongside the converter stations of Dogger Bank Teesside A & B, will interrupt lines of sight between assets which are related, or will contribute to changes in the view from heritage assets, for example an increase in massing or height of buildings which are clearly visible in views from an asset. The scheduled hill fort at Eston Nab is the only heritage asset which shares a visual relationship with operational converter stations of Dogger Bank Teesside A & B and therefore cumulative impacts from other developments would have to have above ground components also visible from this viewpoint.

Construction

5.20.3 The projects which share a boundary with Dogger Bank Teesside A & B and have the potential for cumulative impacts to buried heritage assets during construction comprise:

- Dogger Bank Teesside C & D;
- Tees Renewable Energy Plant Underground Cable;
- York Potash Project; and
- Two wind turbines including compound.

Dogger Bank Teesside C & D

5.20.4 The proposed HVDC cable corridor from the A174 to the Wilton Complex will share a boundary with the HVDC cable for Dogger Bank Teesside A & B, and the potential sites identified from geophysical survey along this stretch of the cable corridor are known to extend into the cable corridor for Dogger Bank Teesside C & D (Archaeological Services University of Durham 2013). The construction of the HVDC cable route will entail additional permanent impacts to non-designated buried archaeological remains which are likely to be of local value; therefore assessed as low importance. The magnitude of change as a result of construction will be high involving the complete removal of

archaeological remains. Mitigation via a planning condition is likely to entail archaeological trench evaluation, detailed excavation and reporting, and once implemented will reduce the residual impact to **minor adverse**.

5.20.5 There are no other cumulative impacts arising from the construction of Dogger Bank Teesside C & D.

Tees Renewable Energy Plant Underground Cable

5.20.6 The underground cable system associated with Tees Renewable Energy Plant, will potentially share a boundary with the HVAC cable for Dogger Bank Teesside A & B, as the application boundary for the project intersects with Dogger Bank Teesside A & B cable system to the north-east of the existing substation at Lackenby. The baseline has identified a low potential for archaeological remains to be present in this area, due to the level of disturbance caused by the construction of the substation, however if archaeology was present it is likely to be related to medieval farming and settlement and will be of low (local) importance.

5.20.7 The construction of the Tees Renewable Energy Plant Underground Cable will potentially entail additional permanent impacts to non-designated buried archaeological remains of low importance. The magnitude of change as a result of construction will be high as it will entail the complete removal of archaeological remains. Mitigation via a planning condition is likely to entail archaeological trench evaluation, detailed excavation and reporting, and once implemented will reduce the residual impact to **minor adverse**.

York Potash Project

5.20.8 The York Potash Project will share a boundary with Dogger Bank Teesside A & B to the south of Kirkleatham, where the pipeline will cross the line of the HVDC cable corridor. The project pipeline crosses either side of a potential archaeological site identified from geophysical survey (**Chapter 27 Terrestrial Archaeology**), resulting in permanent impacts to non-designated buried archaeological remains which are likely to extend beyond the HVDC cable corridor for Dogger Bank Teesside A & B.

5.20.9 The geophysical survey identified possible settlement enclosures relating to archaeological remains of local (low) importance. The level of cumulative impact arising from the pipeline construction is assessed to be high; this assumes the construction will totally remove the asset in its entirety. The adoption of a suitable mitigation strategy, comprising archaeological trench evaluation and a programme of detailed excavation and reporting will result in a **minor adverse** residual impact.

Scoping request for 2 turbines

5.20.10 The project, if consented, will share a boundary with Dogger Bank Teesside A & B to the south of Kirkleatham, where the HVDC cable route crosses the A174 carriageway. This section of the HVDC cable route will be installed via HDD; therefore impacts to buried archaeological remains will be avoided. There will be no change to archaeological assets and the level of impact is **neutral** and no cumulative impacts are anticipated.

Cumulative impacts during operation

5.20.11 The projects with above ground components which have the potential for cumulative impacts during operation to the setting of the hill fort at Eston Nab comprise:

- Dogger Bank Teesside C & D;
- Anemometry mast at the Wilton Centre; and
- Scoping request for two wind turbines.

5.20.12 These projects are located within 1km of Dogger Bank Teesside A & B and have built components which will be visible alongside built components from Dogger Bank Teesside A & B from the scheduled hill fort at Eston Nab. The remaining projects are located beyond 1km and will be viewed as individual sites and clearly distinct from Dogger Bank Teesside A & B in spatial terms, rather than an addition to it. Teesside Power Station and power plant is within 1km of Dogger Bank Teesside A & B but these schemes involve the demolition of generator exhaust stacks and power plant components rather than the construction of built components and as such will not create cumulative impacts.

Dogger Bank Teesside C & D

5.20.13 The converter stations associated with operational Dogger Bank Teesside C & D will be spatially separate from Dogger Bank Teesside A & B and will be located within an existing industrial setting. The proposed development will not represent an impact above that already identified for Dogger Bank Teesside A & B and will not constitute a cumulative indirect effect upon the setting of designated assets of high importance. Operational Dogger Bank Teesside A & B and Dogger Bank Teesside C & D will be visible in the same views from the scheduled hill fort at Eston Nab, however there will be no change to the setting of the asset due to the existing industrial setting of the Wilton Complex. There is no cumulative impact and the overall impact is assessed to be **neutral**.

Anemometry mast at the Wilton Centre

5.20.14 The anemometry mast will be visible from Eston Nab hill fort in views to the north-east, and the upper section of the mast will be clearly visible behind Teesside Dogger Bank A & B converter stations. The visual backdrop of this view is dominated by the existing industrial structures within the Wilton Complex, which includes several structures of a similar height to the proposed mast. The operation of the mast will be in-keeping with the existing setting and will not therefore result in any change to the setting of the hill fort. The hill fort is assessed to be of high importance and there will be no magnitude of change to its setting as a result of the operational mast. There are no cumulative impacts and the overall impact is assessed as **neutral**.

Scoping Request for two turbines

5.20.15 The turbines are likely to be clearly visible in views to the north from Eston Nab hillfort; views that will also take in the converter stations associated with Dogger Bank Teesside A & B. However, the converter stations are located within the industrial setting of the Wilton Complex whereas the proposed turbines will be located in an agricultural setting on the edge of the industrial area. The distance

between the turbines and the converter stations will be sufficient to establish that they are separate developments and there will be no sense that the proposed turbines are part of Dogger Bank Teesside A & B. There will be no cumulative impact arising from the operational two turbine project and therefore the impact is assessed as **neutral**.

5.21 Traffic and access

5.21.1 The projects, activities and plans relevant to traffic and access are detailed in **Table 4.3, (Chapter 28 Traffic and Access)** and a screening assessment was undertaken to identify whether there is sufficient confidence to take any of the projects forward to the assessment.

5.21.2 Department for Transport (DfT) Guidance for Transport Assessments stipulates that:

"The inclusion or exclusion of committed developments in the assessments should be agreed with the relevant authorities at the pre-application stage."

5.21.3 In accordance with this guidance, it has been agreed with The Highways Agency and the local highway authority (RCBC) that Dogger Bank Teesside C & D should not be subject to a transport CIA until such time as the application for those projects is developed. **Appendix 28A** details the agreed minutes of these discussions which were circulated to RCBC who agreed this approach was acceptable.

5.21.4 The screening assessment identified that the that the York Potash Project (including the Potash Processing facility) and the Marske-by-the-Sea Housing Development have the potential to lead to an adverse cumulative impact when considered cumulatively with Dogger Bank Teesside A & B.

York Potash Project

5.21.5 The mine and majority of the pipeline are considered to be remote from the Dogger Bank Teesside A & B projects and are therefore unlikely to have a cumulative impact due to their distance from the study area.

5.21.6 However, the last section of pipeline from the Wilton Complex to near Skelton and the potash processing facility at the Wilton Complex could potentially have a cumulative impact due to the proximity to the converter stations site.

5.21.7 At this stage there is insufficient detail within the public domain with regards to the project timing, expected traffic and access impacts of the York Potash Project. Furthermore, there is no historic data from previous projects as this will be the first project of its type in the UK.

5.21.8 However, it is reasonable to assume that employees and materials for the processing plant and last section of pipeline will be likely to originate from within the study area for Dogger Bank Teesside A & B. Recognising this, and the uncertainty with regard to timing, Forewind will continue to liaise with the York Potash Project promoters and assess any implications of the York Potash Project traffic demand when further detail becomes available and consider measures within the context of the proposed Construction Traffic Management Plan.

Marske-by-the-Sea Housing Development

5.21.9 This project is located to the south of Marske-by-the-Sea, bounded by the A174 to the south, A1085 to the east, Longbeck Road to the west and the Saltburn to Middlesbrough railway line to the north.

5.21.10 The development is expected to be built out in two phases. Phase one will provide up to 500 homes by 2023, with phase two providing the remaining 500 at a later date. The leisure development is expected to be delivered within phase one.

5.21.11 Recognising that the latest Dogger Bank Teesside A & B will start construction is 2020, only phase one of this development would be operational prior to the completion of Dogger Bank Teesside A & B in 2022, as such the cumulative impact of phase two is not considered further.

5.21.12 The Transport Assessment for Marske-by-the-Sea Housing development identifies that there would be 'no material impact' upon road safety from the development. **Chapter 28** identifies that Dogger Bank Teesside A & B will result in a **minor adverse** impact upon highway safety with all other impacts assessed as negligible. Therefore, it is assessed that there is **no cumulative impact** upon highway safety.

5.22 Noise and vibration

5.22.1 This section describes the CIA for Noise and Vibration. A screening exercise was undertaken of the plans, projects and activities, to determine their potential to result in cumulative impacts. Those plans, projects and activities which have the potential to result in cumulative impacts are provided below:

- Tees Renewable Energy Plant Underground Cable;
- York Potash Project; and
- Dogger Bank Teesside C & D.

Construction of Dogger Bank Teesside A & B

5.22.2 **Minor adverse** residual impacts have been identified at various points along the HVDC cable route. As shown in **Chapter 29 Noise**, the 65dB(A) buffer associated with construction of the HVDC cable route is limited to the immediate area (less than 100m from construction). The three projects listed above intersect this 65dB(A) noise buffer and therefore cumulative impact needs consideration.

5.22.3 No residual noise impacts have been identified for the construction of the Dogger Bank Teesside A & B converter stations and HVAC cable route.

5.22.4 If the construction of Dogger Bank Teesside A & B and Dogger Bank Teesside C & D cable routes occurred concurrently, the estimated combined construction noise receptor levels are shown in **Table 5.20**. These are based on the methodology outlined in **Chapter 29** and can be compared to the concurrent Dogger Bank Teesside A & B estimated levels presented in **Chapter 29**. Please note that receptors R1, R2 and R3 are not assessed due to the cable route of

Dogger Bank Teesside C & D being diverted away from these particular receptors.

Table 5.24 Construction noise levels calculated at specific identified receptors for concurrent construction of Dogger Bank Teesside A & B and Dogger Bank Teesside C & D

ID	Property	Noise from cable installation	Noise from major HDD	Total Noise	Magnitude of effect
		dB $L_{Aeq,11h}$	*dB* $L_{Aeq,11h}$	*dB* $L_{Aeq,11h}$	
R4	Bridge Farm	73	64	74	Medium
R5	Residential Properties on Tunstall Gardens	69	64	70	Medium

5.22.5 **Table 5.20** shows that receptors at Bridge Farm and residential properties on Tunstall Gardens may experience medium magnitude effects. Both receptors are close to areas where cable installation and HDD will occur.

5.22.6 A range of mitigation measures are provided in **Chapter 29** and **Table 5.25** presents the residual impacts providing the measures outlined in **Chapter 29** are fully implemented.

Table 5.25 Construction noise levels calculated at specific identified receptors for concurrent construction of Dogger Bank Teesside A & B and Dogger Bank Teesside C & D

ID	Property	Noise from cable installation	Noise from major HDD	Total Noise	Magnitude of effect
		dB $L_{Aeq,11h}$	*dB* $L_{Aeq,11h}$	*dB* $L_{Aeq,11h}$	
R4	Bridge Farm	63	64	67	Low
R5	Residential Properties on Tunstall Gardens	59	64	65	Low

5.22.7 **Table 5.21** demonstrates that **low** residual impacts are predicted for the concurrent construction of Dogger Bank Teesside A & B and Dogger Bank Teesside C & D, at the assessed receptors.

5.22.8 As a result, the cumulative impact on noise during the concurrent construction of Dogger Bank Teesside A & B and Dogger Bank Teesside C & D is anticipated to be no greater than **low**, with mitigation in place (close-boarded fencing).

5.22.9 In relation to the concurrent construction of Dogger Bank Teesside A & B and Dogger Bank Teesside C & D, there are no properties within the construction noise impact buffer around the converter stations sites. Therefore on-site construction works associated with the concurrent converter station builds are predicted to result in an effect of negligible magnitude and therefore a negligible impact. **No cumulative impacts** are predicted.

5.22.10 The use of piling during the construction of all converter stations has not been discounted; however there is a large separation distance present between the construction works and receptors. It is therefore considered that vibration will not adversely affect receptors and has not been assessed in detail. **No cumulative impacts** are predicted.

5.22.11 There are no residential properties close to or within the construction noise buffer zones in the area where the Tees Renewable Energy Plant underground cable or the York Potash Project will intersect the Dogger Bank Teesside A & B project. Therefore, no additional mitigation measures are proposed and the residual impacts will remain as shown in **Chapter 29**.

Operation of Dogger Bank Teesside C & D

5.22.12 Dogger Bank Teesside C & D converter stations operating concurrently with Dogger Bank Teesside A & B were modelled and the resultant levels and impact assessments are shown in **Chapter 29**.

5.22.13 **Figure 5.1** shows the noise level isopleth (contour plot) for both Dogger Bank Teesside A & B, and Dogger Bank Teesside C & D when operating concurrently.

5.22.14 The results in **Table 5.22** demonstrate that, with mitigation installed in converter stations A, B, C and D to reduce the operational noise at the nearest residential receptor to 42dB $L_{Ar,5min}$ and nearest non-residential receptor to 46dB $L_{Ar,5min}$, the magnitude of the effect is negligible for all residential and minor for some non-residential receptors. As such, a **negligible** residual impact is expected for the concurrent operational noise of Dogger Bank Teesside A & B, and Dogger Bank Teesside C & D at residential receptors.

Table 5.26 Residual impacts from mitigated converter station noise (Dogger Bank Teesside A & B, and Dogger Bank Teesside C & D operating concurrently)

Ref No.	Receptor	Floor Level	Noise rating level* ($dB\ L_{Ar,5min}$)	Measured background noise ($dB\ L_{Ar,5min}$)	Exceedance (dB)	Magnitude of effect	Residual impacts
C1	7 Grange Estate	G.Fl	32.2	42	-9.8	Negligible	**Negligible**
C1	7 Grange Estate	1.Fl	33.4	42	-8.6	Negligible	**Negligible**
C2	10 Grange Estate	G.Fl	30.6	42	-11.4	Negligible	**Negligible**
C2	10 Grange Estate	1.Fl	31.5	42	-10.5	Negligible	**Negligible**
C3	20 Grange Estate	G.Fl	33.4	42	-8.6	Negligible	**Negligible**
C3	20 Grange Estate	1.Fl	34.4	42	-7.6	Negligible	**Negligible**
C4	Lazenby Grange Farmhouse	G.Fl	37.9	42	-4.1	Negligible	**Negligible**
C4	Lazenby Grange Farmhouse	1.Fl	38.6	42	-3.4	Negligible	**Negligible**
C4	Lazenby Grange Farmhouse	2.Fl	39.3	42	-2.7	Negligible	**Negligible**
C5	Wilton Golf Club**	G.Fl	39.6	41	-1.4	Negligible	**Negligible**
C6	Wilton Office	G.Fl	46.3	46	0.3	Low	**Minor**

Ref No.	Receptor	Floor Level	Noise rating level* ($dB\ L_{Ar,5min}$)	Measured background noise ($dB\ L_{Ar,5min}$)	Exceedance (dB)	Magnitude of effect	Residual impacts
	Block**						
C6	Wilton Office Block**	1.Fl	46.6	46	0.6	Low	**Minor**
C6	Wilton Office Block**	2.Fl	46.7	46	0.7	Low	**Minor**
C7	Wilton Primary School**	G.Fl	35.5	46	-10.5	Negligible	**Negligible**

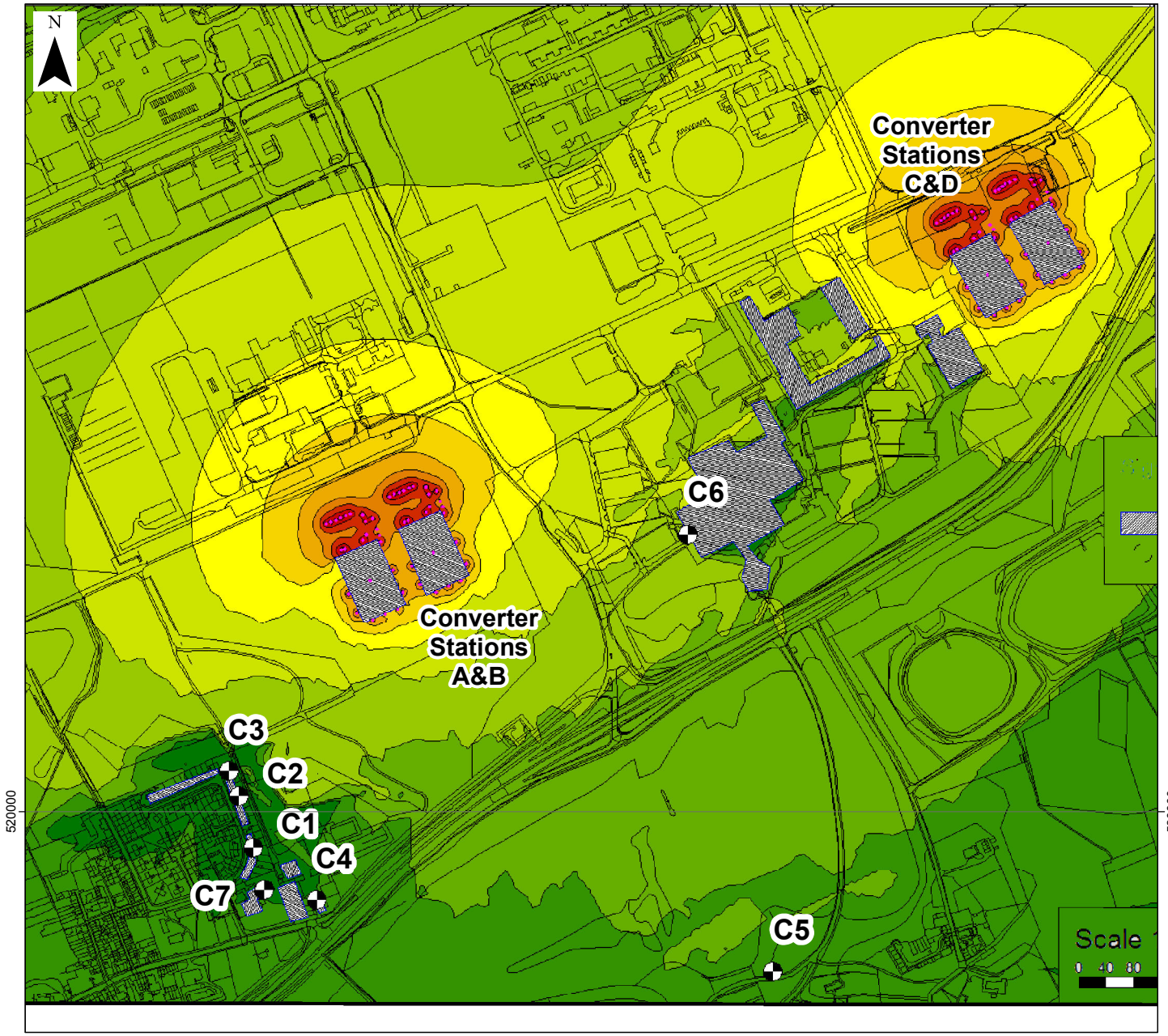
*Noise level modelled at the receptor – external façade.

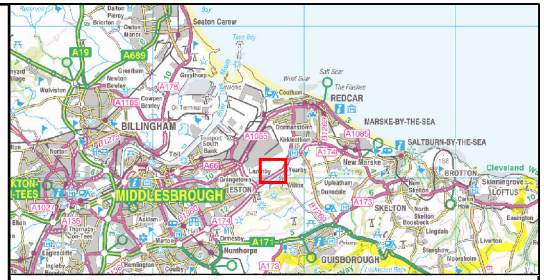
**Non-residential receptor.

***Measured background noise level.

5.22.15 The predicted noise impact of Dogger Bank Teesside A & B (mitigated), and Dogger Bank Teesside C & D (mitigated) operating concurrently will not exceed the existing background levels at all assessed residential and non-residential receptor locations. **No cumulative impacts** are predicted.

5.22.16 The Wilton Office Block is classified as having a low sensitivity as it is not a residential receptor nor is it occupied throughout the night, and the worst-case predicted impact is less than 1dB above threshold. Any further mitigation can be applied during the detailed design phase of Dogger Bank Teesside C & D, and any marginal improvement on this worst-case assessment would ensure that the magnitude of the effect is reduced to negligible at all non-residential receptors.





LEGEND

Noise level
Leq
in dB(A)

	<= 30
30 <	<= 35
35 <	<= 40
40 <	<= 45
45 <	<= 50
50 <	<= 55
55 <	<= 60
60 <	<= 65
65 <	<= 70
70 <	<= 75
75 <	<= 80
80 <	<= 85
85 <	<= 90
90 <	

Point source
Main building
Point receptor

0 400
Meters

Data Source:
Ordnance Survey data © Crown copyright and database right, 2014

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 5.1: Noise contours from mitigated converter stations Teesside A & B and Teesside C & D operating concurrently

VER	DATE	REMARKS	Drawn	Checked
3	28/06/2013	Draft	SEW	SW
5	04/09/2013	Submit for PEI3	SEW	SW
7	18.03/2014	DCO Submission	SEW	SW

DRAWING NUMBER:

F-ONL-MA-624

SCALE	1:9,000	PLOT SIZE	A4	DATUM	OSGB36	PROJECTION	BNG

FOREWIND

5.23 Air quality

Onshore

5.23.1 A screening exercise was undertaken of the plans, projects and activities (shown in **Table 4.3**) to determine their potential to result in cumulative impacts.

5.23.2 Those plans, projects and activities which have the potential to result in cumulative impacts are provided below:

- Tees Renewable Energy Plant Underground Cable;
- York Potash Project;
- Teesside Power Station;
- Dogger Bank Teesside C & D;
- Extension to factory;
- Teesside Power Plant;
- Anaerobic Power Plant; and
- Marske-by-the-Sea Housing Development.

Cumulative impacts during the construction phase

5.23.3 The traffic flows modelled in the construction phase vehicle exhaust emissions assessment included traffic from some of the committed developments detailed in **Chapter 28 Traffic and Transport**. The impact of construction vehicles on NO_2 and PM_{10} concentrations at receptor locations can be defined as **negligible**.

5.23.4 The main effect on local air quality with regard to the construction phase is in relation to dust. Due to the typical dispersal and deposition rates of dust over distances, it is considered that the potential for dust to create a cumulative effect is only likely to be an issue for the closest developments, i.e. those within 50 to 100m of the Project, and if they were to be constructed concurrently. Tees Renewable Energy Plant underground cable, York Potash Project, Teesside Power Station, the Extension to factory, Teesside Power Plant, Anaerobic Power Plant, and the Marske-by-the-Sea Housing Development are in close proximity to onshore elements of the proposed Dogger Bank Teesside A & B. The proposed Dogger Bank Teesside C &D HVDC onshore cable route runs parallel to the proposed Dogger Bank Teesside A & B HVDC onshore cable route. If these developments were constructed concurrently there may be an increased risk of dust emissions adversely affecting sensitive receptors within 350m of the site boundaries.

5.23.5 It is anticipated that the projects identified with potential to result in cumulative impacts, in addition to the Dogger Bank Teesside A & B, would be required to implement Construction Environmental Management Plans (CEMPs) to ensure operational best practice is achieved and emissions resulting from construction activities are controlled. In addition there are legal requirements for management of construction activities. The Institute of Air Quality Management (IAQM) guidance (IAQM 2012) reports that once appropriate site-specific

mitigation measures have been defined, the residual impact will be negligible for most sites. Therefore, even with concurrent construction schedules, the implementation of robust and well managed CEMPs, as has been demonstrated in the assessment of construction phase dust emissions (see **Chapter 30 Air Quality**), would ensure that any offsite cumulative dust impacts would be **negligible**.

Cumulative impacts during the operation phase

5.23.6 The operational phase of all the projects onshore are unlikely to result in impacts on local air quality, with any transport emissions likely to be low level and sporadic; the potential for cumulative impacts is therefore **negligible**.

Offshore

Screening

5.23.7 Offshore projects identified and considered for the assessment of cumulative impacts on air quality include are presented in **Table 5.24** along with a screening exercise to identify whether these are taken forward to the assessment.

5.23.8 For offshore air quality, the potential for cumulative impacts are likely to be associated with engine exhaust emissions from marine vessels used during construction, operation, and decommissioning phases of each project.

Cumulative impacts during the construction phase

5.23.9 There are unlikely to be human receptors at the offshore locations for the projects identified in **Table 5.24** present and exposed for a period of time appropriate to the averaging period of air quality objectives. It is likely that engine exhaust emissions from marine vessels operating offshore will have dispersed well by the time they reach any terrestrial receptors. The cumulative impact of marine vessels on NO_2 and PM_{10} concentrations at terrestrial receptor locations can therefore be defined as **negligible**.

Table 5.27 Cumulative Impact Assessment Screening for air quality offshore

Type of project	Project name	Project status	Expected construction Date	Distance from Dogger Bank Teesside A & B	Potential to result in cumulative air quality impacts?
Offshore wind farm	Dogger Bank Creyke Beck A & B	Submitted in August 2013	Construction may start 2015	Dogger Bank Creyke Beck A approximately 35km Dogger Bank Creyke Beck B approximately 5km	No
Offshore wind farm	Dogger Bank Teesside C & D	Pre-Application	Construction may start from 2016	Dogger Bank Teesside C approximately 7km Dogger Bank Teesside D	N/A*

Type of project	Project name	Project status	Expected construction Date	Distance from Dogger Bank Teesside A & B	Potential to result in cumulative air quality impacts?
				approximately 6km	
Offshore wind farm	Dogger Bank Zone – other future developments	Potential	Not confirmed	Not confirmed	N/A*
Offshore wind farm	Teesside Offshore wind farm	Construction	2013	Dogger Bank Teesside A: 236km Dogger Bank Teesside B: 198km	No
Offshore wind farm	Hornsea Project One	Pre-Application	Project One may start construction 2015	Dogger Bank Teesside A: 116km Dogger Bank Teesside B: 98km	No
Offshore wind farm	Hornsea Zone – other future developments	Potential	Not confirmed	Not confirmed	N/A*
Oil and Gas	Cygnus gas field development (Alpha and Bravo)	Development (pre-production)	Ongoing – production to start in 2015	Alpha: Dogger Bank Teesside A: 47km Dogger Bank Teesside B: 30km Bravo: Dogger Bank Teesside A: 47km Dogger Bank Teesside B: 27km	No
Aggregate extraction	Area 466/1	Application area	Decision expected 2013	Dogger Bank Teesside A: 65km Dogger Bank Teesside B: 28km	No

*Where Forewind is aware that a plan, project or activity could take place in the future, but has no information on how the plan, project or activity will be executed, it is screened out of the assessment.

Cumulative impacts during the operational phase onshore and offshore

5.23.10 The operational phase of all the projects offshore are unlikely to result in impacts on local air quality, with any transport emissions likely to be low level and sporadic; the potential for cumulative impacts is therefore **negligible**.

6 References

Archaeological Services University of Durham (ASUD) 2013 Dogger Bank Teesside Offshore Wind Farm. Onshore Geophysical Surveys Projects A and B (unpublished technical report)

Department for Communities and Local Government. 2013. Guidance on the pre-application process for major infrastructure projects.

Department of Energy and Climate Change (DECC) (2011a). *Overarching National Policy Statement for Energy (EN-1).* London: The Stationery Office.

Department of Energy and Climate Change (DECC) (2011b). *National Policy Statement for Renewable Energy Infrastructure (EN-3).* London: The Stationery Office.

Department of Energy and Climate Change (DECC) (2011c). *National Policy Statement for Electricity Networks Infrastructure (EN-5).* London: The Stationery Office.

European Commission. 1999. Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions. Available at: http://ec.europa.eu/environment/eia/eia-studies-and-reports/guidel.pdf. Accessed 3rd December 2012.

Institute of Air Quality Management (IAQM) (2012) Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their significance

The Planning Inspectorate. 2012. Advice Note 9: Using the 'Rochdale Envelope' Advice Note Nine Rochdale Envelope (Version 2). Available at: http://infrastructure.independent.gov.uk/wp-content/uploads/2011/02/Advice-note-9.-Rochdale-envelope-web.pdf. Accessed 21st March 2013.

