FOREWIND

DOGGER BANK
TEESSIDE A & B

March
2014

Environmental Statement
Chapter 17
Other Marine Users

Application Reference:6.17

Cover photograph: Installation of turbine foundations in the North Sea

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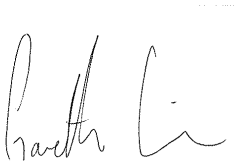
Forewind Approval			
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Dogger Bank Teesside A & B Environmental Statement - Chapter 17 Other Marine Users		Contract No. (if applicable) Onshore ☐ Offshore ☒
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Revision History

Date	Issue No.	Remarks / Reason for Issue	Author	Checked	Approved
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28 June 2013	2	2nd Technical review	TR	AL	AL
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8 October 2013	3	Issued for PEI 3	TR	AL	RAH
28 January 2014	4	Pre-DCO submission Review	TR	BO	AL
14 February 2014	4.1	DCO Submission	TR	BLO	AL

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1. Introduction

1.1.1. This chapter of the Environmental Statement (ES) describes the existing environment with regard to other marine users and assesses the potential impacts of Dogger Bank Teesside A & B during the construction, operation and decommissioning phases. Where the potential for significant impacts is identified, mitigation measures and residual impacts are presented.

1.1.2. Other marine users are considered to be human receptors whose activities could be affected by the development of Dogger Bank Teesside A & B and which are not covered in other chapters. Those considered include other renewable energy projects, carbon capture and storage (CCS), oil and gas activity and infrastructure, underground coal gasification (UCG), undersea mining activities, marine aggregate extraction, marine disposal sites, subsea cables, and capital and maintenance dredging.

1.1.3. Related assessments are included in the following chapters:

- **Chapter 15 Commercial Fisheries**;
- **Chapter 16 Shipping and Navigation**;
- **Chapter 19 Civil Aviation and Military Activities** (including unexploded ordnance (UXO)); and
- **Chapter 23 Tourism and Recreation**.

2. Guidance and Consultation

2.1. Legislation, policy and guidance

2.1.1. The assessment of potential impacts upon other marine users has been made with specific reference to the relevant National Policy Statements (NPS). These are the principal decision making documents for Nationally Significant Infrastructure Projects (NSIP). With particular relevance to this assessment is:

- NPS for Renewable Energy Infrastructure (EN-3) (Department of Energy and Climate Change (DECC) 2011).

2.1.2. The assessment requirements relevant to other marine users, as detailed in EN-3, are summarised in **Table 2.1**, together with an indication of the paragraph numbers of the ES chapter where each is addressed. Where any part of the NPS has not been followed within the assessment, an explanation as to why the requirement was not deemed relevant, or has been met in another manner, is provided.

Table 2.1 NPS assessment requirements

NPS requirement	NPS reference	ES reference
There may be constraints imposed on the siting or design of offshore wind farms because of restrictions resulting from the presence of other offshore infrastructure or activities. Given as a factor influencing site selection and design by the applicant.	EN-3, paragraph 2.6.35	Site selection is addressed in **Chapter 6 Site Selection and Alternatives**.
The applicant should make sure that the "*site selection and site design of the proposed offshore wind farm has been made with a view to avoiding or minimising disruption or economic loss or any adverse effect on safety to other offshore industries*".	EN-3, paragraph 2.6.184	Site selection is addressed in **Chapter 6 Site Selection and Alternatives**.
Where a potential offshore wind farm is proposed close to existing operational offshore infrastructure, or has the potential to affect activities for which a licence has been issued by Government, the applicant should undertake an assessment of the potential effect of the proposed development on such existing or permitted infrastructure or activities.	EN-3, paragraph 2.6.179	Due consideration of other plans, projects and activities is made throughout this chapter.
Applicants should establish stakeholder engagement with interested parties in the potentially affected offshore sectors as necessary early in the development phase of the proposed offshore wind farm with an aim to resolve as many issues as possible prior to the submission of an application….	EN-3, paragraph 2.6.180	Forewind has undertaken a thorough pre-application consultation process, which has been used to inform the EIA. Section 2.2 provides details of the key relevant consultation.

2.1.3. In addition to the NPS, this assessment also considers:

- International Cable Protection Committee (ICPC) recommendations, particularly numbers 2, 3, 5, and 13; and
- Subsea Cables UK (formerly the UK Cable Protection Committee, UKCPC) Guideline 06, which provides guidance on the considerations which should be given by all stakeholders in the development of projects requiring proximity agreements between offshore wind farm projects and subsea cable projects. The guidelines address installation and maintenance constraints related to wind farm structures, associated cables and other submarine cables where such structures and submarine cables will occupy proximate areas of seabed.

2.1.4. A summary of the ICPC recommendations is provided below:

- **ICPC Recommendation No. 2 Recommended Routing and Reporting Criteria for Cables in Proximity to Others** - this recommendation was drafted to assist with reaching agreements by cable owners on the manner of proposed crossings with either existing cables or those in planning. It also *"provides generalised cable routing and notification criteria that the ICPC recommends be used when undertaking cable route planning activities where the cable to be installed crosses, approaches close to or parallels an existing or planned system".*
- **ICPC Recommendation No. 3 Criteria to be Applied to Proposed Crossings between Submarine Telecommunications Cables and Pipelines/Power Cables** - the purpose of this recommendation is to provide guidance for operators who are faced with potential crossings of telecommunication cables, power cables and pipelines. It describes the basic considerations required and lists issues that should be addressed when pipeline/power cables cross telecommunications cables.
- **ICPC Recommendation No. 5 Standardisation of Cable Awareness Charts** - this recommendation relates to accurate communication of the cable location on the seabed to minimise damage from other activities through the production of standardised Cable Awareness Charts. Section 2.6.6 of the Recommendation, Safe Working Distance or Cable Buffer Zone suggests that *"Members may wish to designate a "safe working distance" on either side of the cable corridor. Such a zone indicates the recommended distance sea bed users who conduct activity likely to cause damage to a submarine telephone cable shall keep from the cable"*. The cable owner can set the width of the zone depending on various factors such as water depth.
- **ICPC Recommendation No. 13 Proximity of Wind Farm Developments & Submarine Cables** - Section 4 Separation Recommendations - this relates to the distance between wind turbines and subsea cables and recommends that the position of turbine structures should allow access for a ship to repair an existing subsea cable. The recommended distance is a 500m Safety Zone between cable and turbine. However *"Precise separation distances should be agreed and documented between the*

parties during the planning process", and *"wind farm developers should also consult the following ICPC Recommendation No.7: Procedure To Be Followed Whilst Offshore Civil Engineering Work Is Undertaken In The Vicinity Of Active Submarine Cable Systems".*

2.2. Consultation

2.2.1. 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 (Forewind 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 1 (PEI 1) (report published June 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.

2.2.2. In between the statutory consultation periods, Forewind consulted specific groups of stakeholders on a non-statutory basis (workshops and meetings held during 2012 and 2013 and collectively termed PEI 2), to ensure that they had an opportunity to inform and influence the development proposals.

2.2.3. 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**. A Consultation Report is also provided alongside this ES, as part of the final overall planning submission.

2.2.4. A particular topic requiring detailed consultation has been the potential for Dogger Bank Teesside A & B to interact with existing and/or planned cable and pipeline infrastructure. There are no cables or pipelines within the Dogger Bank Teesside A or Dogger Bank Teesside B project boundaries, however the Dogger Bank Teesside A & B Export Cable Corridor crosses the Langeled gas pipeline, the proposed route of the Breagh pipeline and is in close proximity to an active telecommunication cable at the landfall. The Dogger Bank Teesside A & B Export Cable Corridor also crosses the out of service UK- Denmark 4 cable and the Tata North Europe communication cables crosses in close proximity to the southern boundary corner of Dogger Bank Teesside B (**Figure 4.9**). As such, Forewind is in consultation with relevant operators and developers to reach consensus on proximity and crossing agreements.

2.2.6. A summary of all consultation carried out at key stages throughout the project, of particular relevance to other marine users is presented in **Table 2.2**. This table only includes the key items of consultation that have defined the assessment. A considerable number of comments, issues and concerns raised during consultation have been addressed in meetings with consultees and hence have not resulted in changes to the content of the ES. In these cases, the issue in question has not been captured in **Table 2.2**. 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.

Southern North Sea Offshore Wind Forum

2.2.7. Forewind is actively engaged with Southern North Sea Offshore Wind Forum (SNSOWF), which is a group that includes SMart Wind and East Anglia Offshore Wind and was established to investigate ways to coordinate the approach to offshore wind farm development across the three Round 3 zones in the southern North Sea. This group is limited to discussions on the approach to cumulative impact assessment and the coordination of certain environmental studies.

Table 2.2 Summary of consultation and issues raised by consultees

Date and form of consultation(s)	Consultee	Topic	Summary	ES Chapter reference
14 January 2014 (section 42 consultation on the draft ES, statutory)	**RWE Dea**	Oil & Gas	The discussions centred on the following: • RWE Dea has installed a 20in concrete coated surface laid gas pipeline, with a 3 inch chemical pipeline (largely buried) and separate fibre optic line (surface laid) which have been spaced approximately 50m apart. An additional permit was sought to enable rock placement for some of the e 3in pipeline associated with the rocky outcrop; • RWE would review and comment on the Statement of Intent (SoC) with a note that RWE Dea is for sale at the present time but the SoC should be transferrable; • RWE Dea supported the proposal by Forewind to increase the temporary works area around the crossing of Teesside A & B Export Cable Corridor with the Breagh pipeline by 750m thereby turning the crossing location into a permanent works area; and • RWE Dea has had the BT Cantat cable removed in the nearshore area after discussions with BT through a marine licence (RWE Dea contributed financially to this).	Section 6.7.5
22 November 2013 (section 42 consultation on the draft ES, statutory)	**RWE Dea**	Oil & Gas	There is a possibility that the cable route will cross the RWE-operated Lochran licence area. We would like to make you aware that any company carrying out work within an area in which RWE possesses a licensed interest, must receive RWE's consent before carrying out any work.	Sections 4.4 and 7.3.4
13 February 2013 (PEI 2)	**Centrica North Sea Gas Limited (CNSGL)**	Dogger Bank Zone Response on Interactions from Centrica North sea Gas	Response from CNSGL requesting regular meetings to discuss the progress of the following interactions with their blocks: Dogger Bank Wind farm Area • The proposed Dogger Bank Teesside A overlaps exploration blocks 44/4a, 44/5 and 45/1 in the UK sector operated by CNSGL. A seismic survey is currently being conducted over these blocks. Once the results of this seismic survey are available, CNSGL will formulate its plans for future exploration and development of the area; and • The proposed Dogger Bank Teesside A is adjacent to exploration blocks E1, E2, E4 and E5 in the Dutch sector operated by Centrica Production Nederland B.V. (CPNBV). Exploration plans for these blocks are currently being developed by CPNBV. Once the results of this work are	Sections 4.4, 6.5 and 7.3.

Date and form of consultation(s)	Consultee	Topic	Summary	ES Chapter reference
			available, CPNBV will formulate its plans for future exploration and potential development of the area. Dogger Bank Teesside A & B Export Cable Corridor • The proposed cable corridor will overlap the exploration blocks 36/28 and 36/29 in the UK sector operated by CNSGL. Once Centrica and Forewind have more definition in their plans within the boundaries of these two blocks, further discussions must be held to discuss the impacts on each parties operations.	
04 February 2013 (PEI 2, meeting request)	**Progressive Energy**	Dogger Bank Zone Update and meeting request form Progressive Energy	Progressive Energy to be contacted to provide an update on Forewind and obtain information on their proposed cable route and any interactions it could have with Dogger Bank Teesside A & B.	See Progressive Energy's earlier consultation and references further down in this table.
30 January 2013 (PEI 2, email)	**RWE Dea (UK)**	Dogger Bank Zone Dogger Bank Creyke Beck and Dogger Bank Teesside A & B Introductory email regarding offshore interactions from RWE Dea	A request for Head of Quality, Health, Safety and Environment (QHSE) to be added to the distribution list regarding project interactions.	N/A
January 2013 – December 2013	**Cleveland Potash Ltd (CPL)**	Dogger Bank Teesside A & B Export Cable Corridor and CPL activities agreement of MOU and Statement of Intent.	A series of meetings and discussions held with regard to potential interaction of activities between CPL and the construction of Dogger Bank Teesside A & B Export Cable Corridor. Special reference was made to the following: • Proximity agreements discussed for cable installation and the future extension of CPL mining activities; • Communication of CPL seismic surveys to Forewind; • Concerns addressed over the potential increase in suspended sediment concentration in the vicinity of the CPL intake as a result of installation of the Dogger Bank Teesside A & B Export Cable Corridor; and • Concerns addressed over the potential increased deposition over the CPL spoil grounds as a result of Dogger Bank Teesside A & B Export Cable Corridor installation.	Section 6.4.2

Date and form of consultation(s)	Consultee	Topic	Summary	ES Chapter reference
23 November 2012 (PEI 2)	**Cleveland Potash Limited (CPL)**	Dogger Bank Teesside CPL agreement advice from The Crown Estate	Call between The Crown Estate and Forewind regarding CPL mines which extend under the Dogger Bank Teesside A & B Export Cable Corridor. The concern is that activities of the potash mines can create seabed subsidence. Further meetings with CPL to discuss the situation are being organised.	Sections 4.3 and 6.4.
23 August 2012 (PEI 2, email)	**National Grid Carbon**	CCS storage	National Grid is involved in two applications for Department of Energy and Climate Change (DECC) funding for CCS projects in Teesside. They expect a decision in October and if successful, would aim to start consulting stakeholders in early 2013. Forewind has agreed to keep up to date through the regular calls that have already been set up for Dogger Bank Creyke Beck A & B.	Sections 4.2, 6.3 and 7.2.
June 2012 (Scoping)	**Secretary of State**	Methodology	The outline of the existing environment in the context of other marine users is varied in its content. The Scoping Report states that a desk top study will be carried out to identify and consider potential impacts. As the topic range is varied, a single methodology would appear to be insufficient. The Secretary of State advises that the scope and method of assessment for each marine user should be developed individually with a comparative thread to allow for the assessment of interrelationships and cumulative effects.	Sections 3 and 4.
03 April 2012 (Creyke Beck PEI 1 meeting)	**Marine and Coastguard Agency (MCA) and Trinity House Lighthouse Service (THLS)**	Discussions regarding Dogger Bank, in particular Dogger Bank Creyke Beck with MCA and Trinity House	• Both the MCA and THLS raised concerns over the naming of both Creyke Beck and Dogger Bank Teesside A & B developments due to potential issues for Search and Rescues (SAR) responses due to geographical confusion; • Consideration should be given to the future life of developments, especially SAR Emergency Response Cooperation Plans (ERCoPs), Health and Safety Executive (HSE) documents and Aids to Navigation (AtoN) maintenance, when projects will be individually owned and managed; • The MCA raised concerns over the potential differing sizes of turbines within developments. Consideration should be given to ensure the mariner does not become confused by differing sizes of turbines and gaps; • Lighting, marking and numbering should be synchronised between each site again to aid mariners (including fishermen), it should remain this way through the life of the project;	**Chapter 5 Project Description** **Chapter 15 Commercial Fisheries** **Chapter 16 Shipping and Navigation** **Chapter 19 Civil Aviation and Military Activities**

Date and form of consultation(s)	Consultee	Topic	Summary	ES Chapter reference
			• The importance of user consultation with Navigational Risk Assessments (NRAs) and Environmental Statements (ESs) was highlighted; • It was felt that routine merchant traffic would not be anticipated within the zone, given the unique circumstances at Dogger Bank (the size of the development, distance offshore, low traffic densities, small deviation distances, and lack of stakeholder desire for access), and that therefore any channels within the layouts would not necessarily be required to consider access for commercial navigation. However, consideration for SAR, fishing and other activities taking place within the site should be considered from a navigational safety perspective; • MCA and THLS considered there was potential for the use of floating aids to navigation; development areas and Areas to be Avoided; • MCA and THLS highlighted the importance of clearly defined sites to aid SAR, including consideration for turbine numbering, to give continuity and so aid the mariner; • Arrays with curved rows were considered and viewed as possibly acceptable, assuming arrays are arranged rationally and numbering is clear. Arrangements with a dense perimeter band were considered and felt to be positive, including for SAR purposes.	
18 January 2012 (Creyke Beck PEI1 s42 Consultation Response)	**GDF Suez Limited**	Oil & Gas	GDF SUEZ E&P UK Ltd have applied for permission to develop the Cygnus gas field, which is located approximately 10km southeast of the Dogger Bank Round 3 development area. It is understood that the first area to be developed will be Forewind's Creyke Beck, located in Tranche A in the southern part of the development area. GDF SUEZ E&P UK recently submitted an Environmental Statement (ES) in support of its Cygnus development to the Department of Energy and Climate Change (DECC), which is publicly available for download at: http://www.gdfsuez.com/uk/CygnusES The Cygnus base case is for piling is in 2014 and 2015; however, an attempt will be made to install one or more jackets in 2013 with completion in 2014. Although there is presently no piling scope for Cygnus in 2015, it cannot be ruled out at this point. The DECC's comments on the Cygnus ES include a requirement to consider the potential impact should development timescales	Sections 4.4, 6.5 and 7.3. Impacts from piling on fish and marine mammals are covered in **Chapter 13 Fish and Shellfish Ecology** and **Chapter 14 Marine Mammals** respectively.

Date and form of consultation(s)	Consultee	Topic	Summary	ES Chapter reference
			slip resulting in construction occurring at the Dogger Bank wind farm at the same time as at Cygnus. The primary cumulative impact will be subsea noise as a result of piling activities. The publicly available information from Forewind indicates that construction at Creyke Beck will commence in 2015 and thus, should there be a delay in the Cygnus development, there is potential for overlap of piling activities. If this were the case, GDFR suggested that a coordinated approach to piling could be explored between Forewind and GDF SUEZ E&P UK.	
21 October 2011 (Pre-application meeting)	**Progressive Energy**	CCS (Dogger Bank Zone Teesside Meeting with Progressive Energy)	Progressive Energy's CCS project in the North East (Teesside) currently operates as two companies. 1. Coastal Power Limited is developing a coal-fuelled Integrated Gasification Combined Cycle Power Station incorporating Carbon Capture. 2. COOTS Limited is developing a CO_2 transport and storage infrastructure to deliver CO_2 through a 500 km pipeline to the North Sea oil fields for Enhanced Oil Recovery or delivery to an intermediate saline aquifer storage site. The project involves CO_2 sequestration. Teesside is ideal for this development as the estuary provides the cooling water, there are good rail links, good chemical processing in the local area and a good availability of brownfield sites. Progressive Energy is proposing an offshore pipeline in the nearshore area between the existing BP CATS pipeline and the Teesside Offshore Windfarm. Further offshore, the pipeline route would run parallel to the north of the CATS pipeline, before branching off and following the Langeled pipeline. The pipeline will have a total length of between 300 to 400km.It would operate at a pressure of around 190bar, and there is the possibility of adding a future booster on the pipeline. Forewind and Progressive Energy discussed the possibility that the same sites were being considered for the various developments. Progressive Energy thought that it was unlikely, but it was agreed that both parties should be mindful of the possibility and discuss the issue further as appropriate.	Sections 4.2, 6.3 and 7.2.

3. Methodology

3.1. Study area

3.1.1. The study area for this assessment has a wide geographic scope to ensure that all plans, projects and activities that have the potential to be influenced by Dogger Bank Teesside A & B are identified and included in the assessment. In the majority of cases, this area is encompassed by the offshore Zone Development Envelope (ZDE[1]).

3.1.2. The assessment considers existing, as well as planned projects and activities, where information is within the planning system, otherwise publicly available, or has been made available to Forewind through the consultation process.

3.2. Characterisation of the existing environment – methodology

3.2.1. The on-going consultation process and a desk based study of available data have been used to inform the characterisation of the existing environment. This data included information from government departments, regulator and industry websites as well as from the following sources;

- The Crown Estate (offshore wind farm lease sites and aggregate areas);
- UK Deal (oil and gas infrastructure);
- DECC (oil and gas, offshore coal, CCS);
- The Coal Authority (UCG);
- Operators' data, Subsea Cables UK, ICPC and Kingfisher Charts (Kingfisher Ltd);
- Information Service - Offshore Renewable and Cable Awareness project (KISORCA 2013) (location of submarine cables);
- SeaZone hydrospatial datasets (various data);
- Centre for Environment, Fisheries and Aquaculture Science (Cefas) (dredging and disposal sites);
- Existing Forewind project database (including GIS), built up through the ongoing development process;
- Dogger Bank Zonal Characterisation – Interim Report, October 2010; and
- Dogger Bank Zonal Characterisation – 2nd Edition, December 2011.

3.2.2. Data from the latest offshore oil and gas licensing round (27th) has been considered in this chapter. However, it is noted that some awards within the

[1] The offshore ZDE is the area comprising all of the marine aspects of the ZDE from Mean High Water Springs. It includes the Dogger Bank Zone and the Dogger Bank Teesside A & B Export Cable Corridor.

Dogger Bank Zone are subject to on-going Appropriate Assessment (AA). These blocks were confirmed and issued for public consultation in March 2013.

3.2.3. Of these, block 43/10 is found within Tranche A but does not overlap Dogger Bank Teesside B. However blocks 42/5, 42/7, 42/8b, 42/9b overlap the Dogger Bank Teesside A & B Export Cable Corridor (see **Figures 4.4 and 4.5** in Section 4).

3.3. Assessment of Impacts – methodology

3.3.1. The assessment follows the general methodology set out in **Chapter 4 EIA Process**. Definitions of receptor sensitivity, magnitude of effect, and the impact matrix applied to the assessment of impacts on other marine users are provided in **Tables 3.1** to **3.3** below.

Receptor sensitivity

3.3.2. Definitions of the sensitivity of other marine user receptors are provided below in **Table 3.1**.

Table 3.1 Definitions of sensitivity of a receptor

Sensitivity	Definition
Negligible	Receptors or activities not likely to be affected by the development.
Low	Activities of local importance to one or more other marine users, adaptable to and tolerant of change, or can recover over short time period.
Medium	Activities of national importance that may be able to tolerate some disruption, or would be expected to recover without long-term effects e.g. disruption to other marine renewable energy projects.
High	Activities of international importance or recovery only possible over long time period e.g. damage to a pipeline or subsea cable.

Magnitude of effect

3.3.3. Definitions of the magnitude of effect predicted to arise on other marine users are provided below in **Table 3.2.**

Table 3.2 Definitions of magnitude of an effect on other marine users

Magnitude	Definition
Negligible	Little or no detectable disruption.
Low	Temporary and low level disruption of approved or licenced activity or services.
Medium	Temporary disruption that affects an approved or licenced activity or services, but does not threaten future viability.
High	Permanent or long lasting disruption that threatens the future viability of an approved or licenced activity or services.

Overall Impact

3.3.4. The overall impact is based on the interaction between the magnitude of the effect and the sensitivity of the receptor. **Table 3.3** (below) presents an indicative guide to derive the overall impacts on other marine user receptors.

Table 3.3 Overall impact resulting from each combination of receptor sensitivity and the magnitude of effect

Receptor sensitivity	Magnitude of effect			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

3.3.5. Potential impacts identified within the assessment as major or moderate are regarded as significant in terms of the Environmental Impact Assessment (EIA) regulations. In these cases, appropriate mitigation, either in the form of specific mitigation measures, or a commitment to develop mitigation through further consultation with organisations whose assets/activities may be adversely affected is provided. The aim of these mitigation measures is to avoid or reduce the impact on the asset/activity.

3.3.6. A desk-based study and stakeholder consultation has been used as part of an iterative process to guide the scope of the impact assessments, in addition to informing the selection of the project boundaries (see **Chapter 6 Site Selection and Alternatives** for further details).

4. Existing environment

4.1. Other renewable energy projects

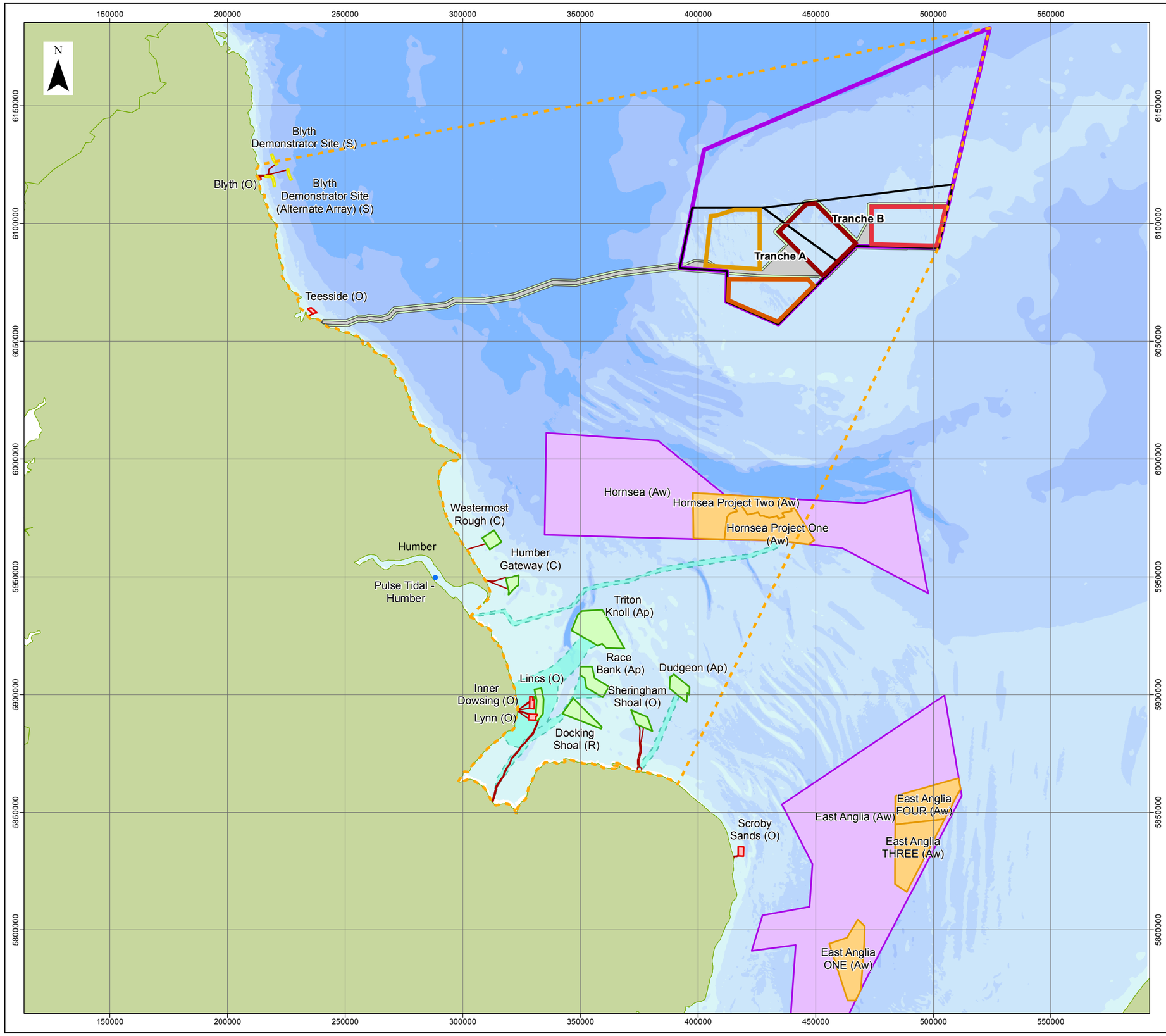
Offshore wind farm projects

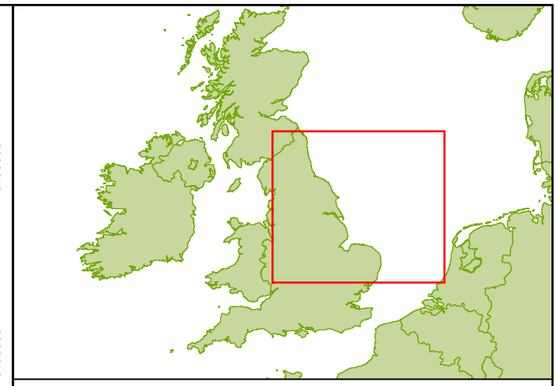
4.1.1. Other wind farm projects in the vicinity of Dogger Bank Teesside A & B are shown in **Figure 4.1**. There is a general absence of existing and planned projects from other developers in the vicinity of Dogger Bank Teesside A & B. The other development in close proximity will be Dogger Bank Creyke Beck A & B (also Forewind). Those developments which are shown in **Figure 4.1** are of particular relevance to this assessment with respect to cumulative impacts (see Section 10). The status of each of these projects with regard to their development and timescales is shown in **Table 4.1**. This also provides an indication of the potential overlap in construction activities of other projects with Dogger Bank Teesside A & B.

4.1.2. The closest major offshore wind farm development to Dogger Bank Teesside A & B is the Round 3 Hornsea Zone (Optimus project), which is located 112km from the southern boundary of Dogger Bank Teesside A and 95km from Dogger Bank Teesside B (**Figure 4.1**). The Hornsea Zone is being developed by SMart Wind, a consortium comprising Mainstream Renewable Power, Siemens Project Ventures GmbH and DONG Energy Ltd. The Hornsea Zone has a 4GW target capacity. Development Consent Order application for Project One (95km to the south of Dogger Bank Teesside B) is expected in Q4 2013, with earliest construction understood to be 2015. The second project in the Hornsea Zone (Project Two, to the north and west of Project One), for which a Scoping Report was submitted to the Planning Inspectorate in October 2012, is currently expected to start construction in late 2015 or 2016.

4.1.3. Teesside Offshore Windfarm is operated by EDFER and is now in operation with a capacity of 62MW. Located 1.5km from the shore at its closest point between Redcar and the mouth of the River Tees this wind farm is 4.5km from the Dogger Bank Teesside A & B Export Cable landfall but over 100km from Dogger Bank Teesside A & B. The export cable landfall for Teesside Offshore Windfarm is 6km to the north of the Dogger Bank Teesside A & B Export Cable landfall.

4.1.4. Other wind farms within the Dogger Bank Zone which Forewind proposes to develop in the future include Dogger Bank Teesside C & D. While Forewind has identified the precise locations of the first two Dogger Bank Teesside projects (Dogger Bank Teesside A & B) the locations of the further two Dogger Bank Teesside projects (Dogger Bank Teesside C & D) have yet to be determined but it is known that they will be located to the north of tranches A and B within Tranche C.





LEGEND

- Dogger Bank offshore zone development envelope
- Dogger Bank Zone
- Tranche Boundary
- Dogger Bank Creyke Beck A
- Dogger Bank Creyke Beck B
- Dogger Bank Teesside A
- Dogger Bank Teesside B
- Dogger Bank Teesside A & B Export Cable Corridor
- Temporary works area
- Tidal energy project

Wind energy projects

- Round 1
- Round 2
- Round 3
- Round 3 zones
- Demonstration
- North Sea wind farm cable corridor
- North Sea wind farm export cable route

Wind Farm Status - Awarded (Aw), Submitted (S), Approved (Ap), Under Construction (C), Operational (O), Refused (R)

0 10 20 40
Kilometres

Data Source:
Energy Projects © The Crown Estate, 2014
Background bathymetry image derived in part from TCarta data © 2009

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.1 Other renewable energy projects

VER	DATE	REMARKS	Drawn	Checked
1	16/08/2013	Draft	FK	PT
2	03/10/2013	PEI3	JE	PT
3	14/02/2014	DCO Submission	LW	PT

DRAWING NUMBER:

F-OFL-MA-573

SCALE	PLOT SIZE	DATUM	PROJECTION
1:1,650,000	A3	WGS84	UTM31N

FOREWIND

Table 4.1 Offshore wind farm projects within the study area

Project (and bidding round)	Developer/Owner	Nearest point to Dogger Bank Teesside A (km)	Nearest point to Dogger Bank Teesside B (km)	Distance of export cable landfall to Dogger Bank Teesside A & B Export Cable Landfall (km)	Nearest point to Dogger Bank Teesside A & B Export Cable Corridor (km)	Capacity (up to)	Status/timescale
Dogger Bank Creyke Beck A (CB A) and Creyke Beck B (CB B) (R3)	Forewind	CB A: 28 CB B: 46	CB A: 4 CB B:6.2	Landfall: 85	CB A: 20 CB B: 9.8	2.4GW	Application due to be submitted 2013
Hornsea Zone Project One and Project Two (R3)	SMart Wind	Optimus: 112 Breesea: 123 Heron: 122 Nord: 116	Optimus: 95 Breesea: 100 Heron: 101 Nord: 99	Landfall: 140	Optimus: 99 Breesea: 96 Heron: 102 Nord: 110	1.2GW (Project One) 1.8GW (Project Two)	Project One application expected 2013. Offshore construction anticipated to begin in 2015. Project Two first phase of consultation during 2013. Construction anticipated to begin before 2015/16
Teesside Offshore Windfarm project (R1)	EDF Energy Renewables	240	199	Landfall: 6	4.5	62MW	Fully Operational
Blyth Offshore Demonstration Site	Narec	246	207	68	60	99.9MW	Application submitted and awaiting consent. The earliest start date for the construction of the demonstration turbine arrays will be Q1/2 2014 and the expectation is that all three arrays will be constructed by the end of 2016

Project (and bidding round)	Developer/Owner	Nearest point to Dogger Bank Teesside A (km)	Nearest point to Dogger Bank Teesside B (km)	Distance of export cable landfall to Dogger Bank Teesside A & B Export Cable Landfall (km)	Nearest point to Dogger Bank Teesside A & B Export Cable Corridor (km)	Capacity (up to)	Status/timescale
Westermost Rough (R2)	DONG Wind UK	200	175	N/A	97	240MW	Consented, offshore construction expected to begin 2014
Triton Knoll (R2)	RWE	192	169	N/A	136	1.2GW	Consented. Offshore construction expected to begin during 2017
Humber Gateway (R2)	E.ON Climate and Renewables	208	180	N/A	116	219MW	Consented offshore construction commenced with the cable corridor
Dudgeon (R2)	Dudgeon Offshore Wind Ltd acquired by Statoil and Statkraft (2012)	202	182	N/A	172	560MW	Consented, construction expected to start 2015
Race Bank (R2)	Centrica Renewable Energy	214	192	N/A	159	580MW	Consented, construction to commence 2015
East Anglia Offshore Windfarm Zone and East Anglia ONE (R3)	Vattenfall and Scottish Power Renewables	Zone: 190 EA1: 286	Zone: 185 EA1: 273	N/A	Zone: 214 EA1: 287	Up to 7.5GW over 5 phases	Application submitted November 2012. Earliest construction of East Anglia ONE expected 2015

Project (and bidding round)	Developer/Owner	Nearest point to Dogger Bank Teesside A (km)	Nearest point to Dogger Bank Teesside B (km)	Distance of export cable landfall to Dogger Bank Teesside A & B Export Cable Landfall (km)	Nearest point to Dogger Bank Teesside A & B Export Cable Corridor (km)	Capacity (up to)	Status/timescale
Sheringham Shoal (R2)	Scira Offshore Energy	221	201	N/A	182	317MW	Fully operational
Lincs (R2)	Centrica Renewable Energy	234	212	N/A	166	270MW	Fully operational
Inner Dowsing (R1)	Centrica and TCW	239	217	N/A	169	97MW	Fully operational
Lynn (R1)	Centrica Renewable Energy	244	222	N/A	176	97MW	Fully operational

Tidal energy projects

4.1.5. The Pulse tidal energy project is the only other known renewable energy installation in the study area and is located 232km and 208km from the western boundary of Dogger Bank Teesside A & B respectively, and 100km from the Dogger Bank Teesside A & B Export Cable Corridor (**Figure 4.1**). The 100kW 'Pulse-Stream 100' prototype test site, located approximately 1km off the south bank of the Humber near Immingham, began generating electricity in May 2009. The power is exported to Millennium Chemicals, a large plant on the south bank of the Humber Estuary. Ultimately, the facility's capacity is intended to be increased to 1MW (Pulse Tidal 2009). More recently due to the success of the prototype, Pulse Tidal was awarded an £8m grant to demonstrate Pulse-Stream at 1.2MW commercial scale. Engineering of this machine is now well advanced and production is expected to begin at the end of 2013 (RenewableUK 2013).

4.1.6. On account of the distance of this project to Dogger Bank Teesside A & B and the absence of any other relevant plans and projects in the study area, tidal energy projects are scoped out of the assessment at this point and are not discussed further.

4.2. Carbon capture and storage

4.2.1. CCS combines three distinct processes: capturing carbon dioxide (CO_2) at a power station or other major industrial plant; transporting it by pipeline or by tanker; and then storing it in geological formations such as saline aquifer formations or depleted oil and gas fields.

4.2.2. At present, the only two operational CCS projects in the North Sea are at Sleipner (primary company: Statoil) in Norwegian waters and a small pilot operation at the Dutch K12-B gas field (primary company: GDF Suez). There are currently no active CCS projects (that include detailed plans for CO_2 transport and storage) in the planning system within the study area.

4.2.3. However, the UK Government's target to reduce carbon emissions by 80% by 2050 (see **Chapter 2 Project Need**) has led DECC to progress with a programme of four commercial-scale CCS demonstration projects, to be implemented by 2020, with more substantial developments taking place at a point when the industry is more technologically and economically advanced (DECC 2012a). CCS demonstrator projects are associated with areas of high CO_2 emissions, such as Humberside and Teesside, and the UK Government plans to promote their co-location or 'clustering' to maximise efficiency (DECC 2012a).

4.2.4. Of particular relevance to Dogger Bank Teesside A & B is the consortium Teesside Low Carbon which has been formed by BOC, International Power, Premier Oil and Progressive Energy. This group has plans to bid for funding to develop a CCS project in Teesside, with the aim of providing the basis for the development of a power and industrial CCS cluster in Teesside and the wider North East of England. The project will be built on an industrial site in Wilton and will produce low carbon energy for households as well as providing carbon capture infrastructure for industrial production of CO_2. CO_2 will be transported via pipelines, provided by National Grid to depleted oil fields and a saline aquifer

in the North Sea. Both Premier Oil and Progressive Energy hold licences on the depleted oil fields and the aquifer. An investment decision is expected to be made towards the end of 2013, subject to support funding and CO_2 storage is expected to begin in 2016. The CCS pipeline landfall is shown in **Figure 4.2** and is located 5.9km from the Dogger Bank Teesside A & B Export Cable landfall.

4.2.5. National Grid Carbon (NGC) will be responsible for the design, construction and operation of the associated CO_2 transport systems and the identification of the offshore storage sites.

4.2.6. NGC is also working in Humberside, through its Humber Gateway development, with 2Co Energy (Don Valley Power CCS) Project near Doncaster; the Alstom, Drax and BOC Linde on the White Rose CCS Project near Selby and C.Gen Power on its North Killingholme CCS Power Project.

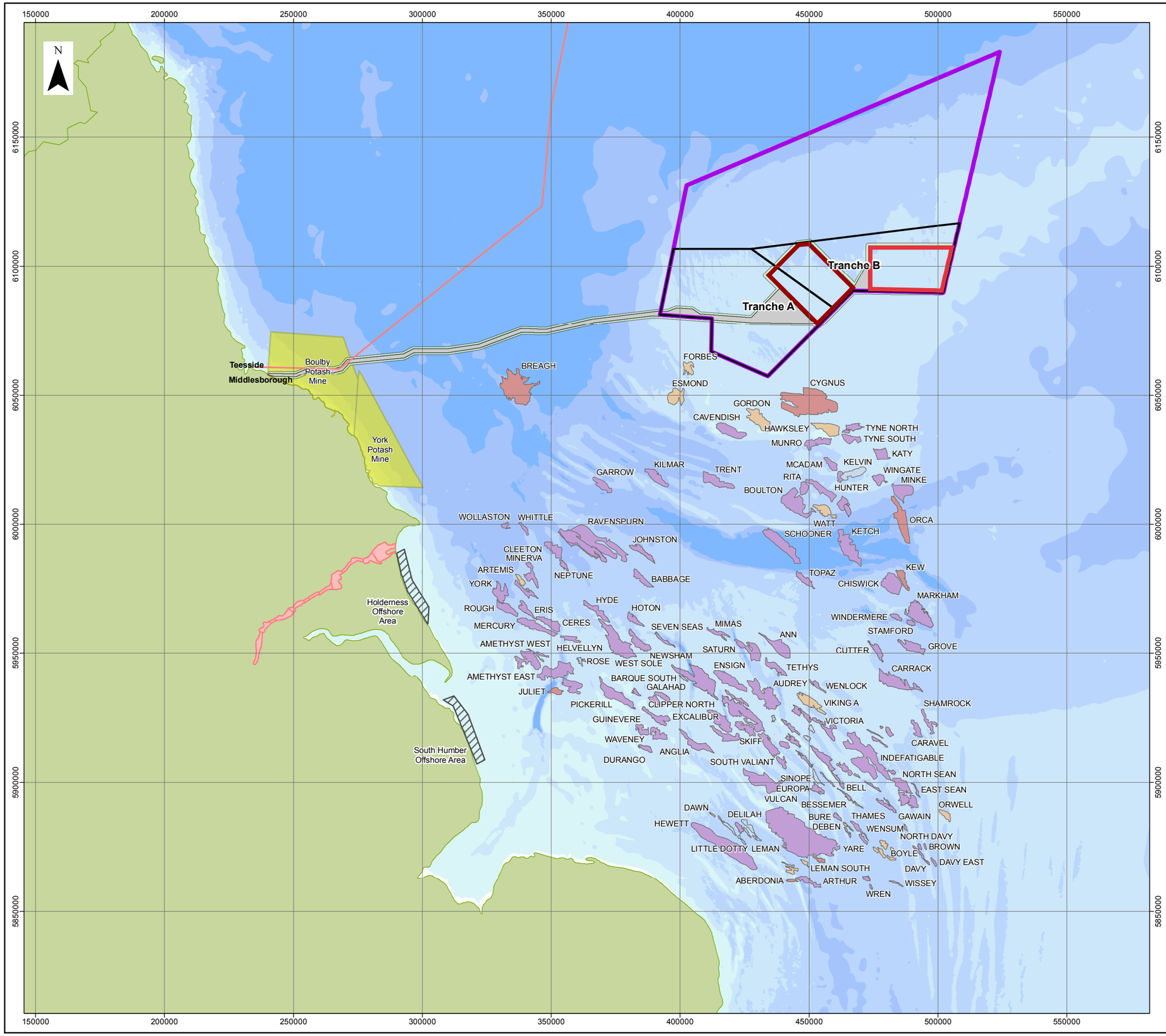
4.2.7. In November 2011, NGC announced the route corridor for a pipeline from the proposed 2Co Energy Don Valley Power CCS Project. The preferred route corridor extends from Stainforth in South Yorkshire in a north easterly direction, and out to a coastal area near Barmston (near to the Dogger Bank Creyke Beck export cable landfall at Ulrome). This is located 82km south of the Dogger Bank Teesside A & B Export Cable landfall (**Figure 4.2**).

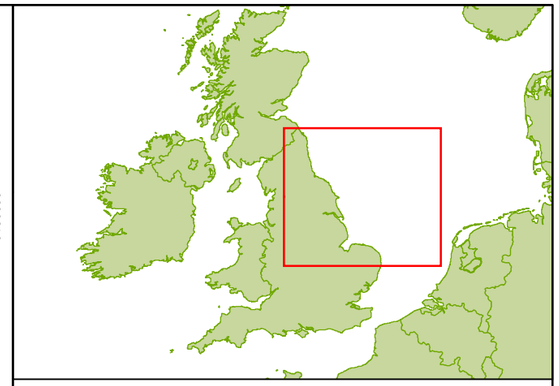
4.2.8. As noted above in paragraph 4.2.4, CO_2 emitted by any of the proposed CCS plants associated with the projects identified above would be transported by offshore pipelines, provided by NGC, to depleted oil fields in the central or southern North Sea, where it would be injected for permanent storage. Notably, the Forbes, Esmond and Gordon gas fields to the southwest of the Dogger Bank Zone (**Figure 4.2**) are depleted fields, which have been identified for potential underground storage of natural gas. Although none of the CCS projects identified above have confirmed plans to utilise these particular fields for CCS purposes, they have been identified as potential sites for future use by the industry. The closest of these fields to the development area is the Forbes Field, which is 21km from the Dogger Bank Teesside A & B Export Cable Corridor and 44km to the west, south west of Dogger Bank Teesside B boundary.

4.2.9. CCS technology is supported by government initiatives and is of national importance in terms of the development of a low carbon economy and achieving government targets for low carbon energy production.

4.3. Potash Mining

4.3.1. Cleveland Potash Limited (CPL) is a producer and supplier of potash fertilizers for agriculture and industry uses. CPL operates the UK's only potash mine, which produces over a million tonnes of potash for fertilizers and more than half a million tonnes of salt each year. The mine is operating under the North Sea (**Figure 4.2**) and the mine extends, and is currently active, under the Dogger Bank Teesside A & B Export Cable Corridor. The dredging and disposal site is located 3km from Dogger Bank Teesside A & B Export Cable Corridor.





LEGEND

- Dogger Bank Zone
- Tranche boundary
- Dogger Bank Teesside A
- Dogger Bank Teesside B
- Dogger Bank Teesside A & B Export Cable Corridor
- Temporary works area
- Potash mine
- Underground coal gasification areas
- Don Valley power CCS preferred route corridor
- Teesside CCS potential pipeline route

Oil and gas fields

- Gas, producing
- Gas, production ceased
- Gas, production suspended
- Gas, under development
- Oil, producing
- Oil, production ceased
- Oil, production suspended
- Oil, under development

0 10 20 40

Kilometres

Data Source:
Oil & Gas data © DECC, 2014
Underground Coal Gasification © Coal Authority 2013,
Background bathymetry image derived in part from TCarta data © 2009

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.2 Oil and gas fields, CCS, UCG and mining

VER	DATE	REMARKS	Drawn	Checked
1	15/08/2013	Draft	FK	PT
2	03/10/2013	PEI3	JE	PT
3	14/02/2014	DCO Submission	LW	TR

DRAWING NUMBER:

F-OFL-MA-574

SCALE	1:1,500,000	PLOT SIZE	A3	DATUM	WGS84	PROJECTION	UTM31N

FOREWIND

4.4. Oil and gas activity

4.4.1. Oil and/or gas fields (geographical area under which an oil or gas reservoir lies) are defined as follows: producing; ceased production; suspended; or under development. In the southern North Sea, in which Dogger Bank Teesside A & B is located, almost all of the fields are gas fields and all are to the south of the Dogger Bank Zone (**Figure 4.2**). The closest fields include the Forbes, Esmond and Gordon fields, all of which are now depleted and ceased production but may be utilised in the future for CCS (see Section 4.2).

4.4.2. The Cygnus gas field is situated to the south east and south of Dogger Bank Teesside A & B respectively (licence blocks 44/11a and 44/12a) and is under development. Within this field, the planned Cygnus Alpha and Cygnus Bravo developments are approximately 43km and 25km respectively from the boundary of Dogger Bank Teesside A & B (**Figure 4.3**). This field is operated by GDF Suez E&P UK, with additional owners being Centrica and Bayerngas. It is the largest discovery in the southern North Sea in the last 25 years (GDF Suez 2012). The detailed development concept for the Cygnus field consists of two drilling centres, four platforms and initially ten development wells. The planned gas export route is through the Esmond Transportation System (ETS) pipeline to the Bacton gas terminal in North Norfolk.

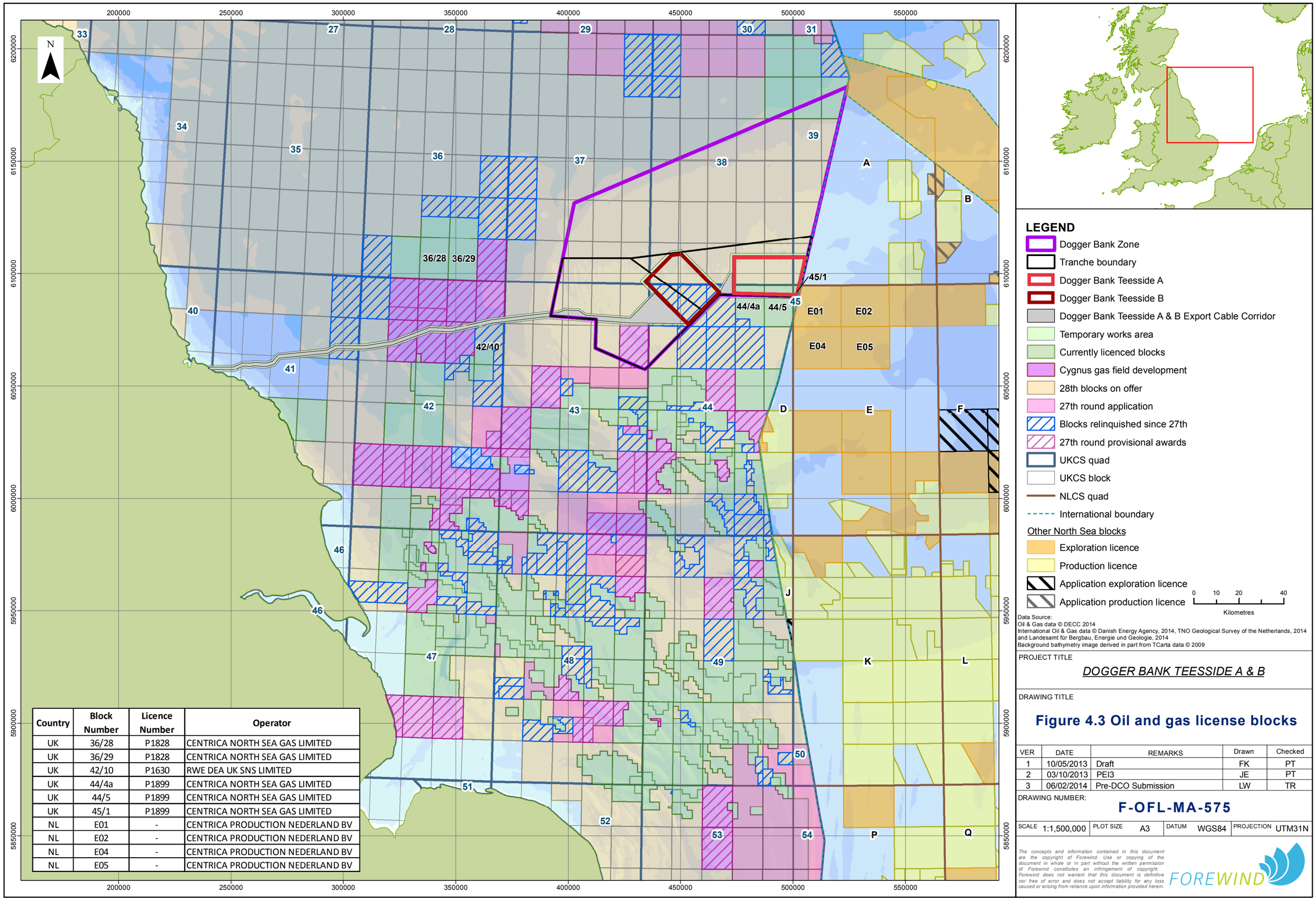
4.4.3. GDF Suez E&P UK is planning to install one or two jacket piles during 2013 with the completion of this activity in 2014. The first phase of development will focus on the eastern part of the field, consisting of two production wells connecting to an unmanned wellhead platform. Production will be exported via a 27km, 300mm diameter pipeline to the Murdoch field centre. This part of the development is expected to come online in 2015.

Oil and gas licensing activity

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

4.4.5. There are a number of different licences within and in close proximity to Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor and the currently licence blocks available under the 28th round are shown in **Figure 4.3**.

4.4.6. A number of licence blocks have been identified as having the potential to impact on relevant European sites of conservation importance and have been taken forward to Appropriate Assessment. **Figure 4.4** shows the relevant licence blocks subject to Appropriate Assessment within Tranche A and B. There is one relevant licence block (43/10) in Tranche A (which is not within the Dogger Bank Teesside B boundary) and none have been identified in Tranche B (in which Dogger Bank Teesside A is located). The Dogger Bank Teesside A & B Export Cable Corridor is overlapped by a number of licence blocks identified for Appropriate Assessment namely 42/5, 42/7, 42/8b and 42/9b (**Figure 4.5**).



Country	Block Number	Licence Number	Operator
UK	36/28	P1828	CENTRICA NORTH SEA GAS LIMITED
UK	36/29	P1828	CENTRICA NORTH SEA GAS LIMITED
UK	42/10	P1630	RWE DEA UK SNS LIMITED
UK	44/4a	P1899	CENTRICA NORTH SEA GAS LIMITED
UK	44/5	P1899	CENTRICA NORTH SEA GAS LIMITED
UK	45/1	P1899	CENTRICA NORTH SEA GAS LIMITED
NL	E01	-	CENTRICA PRODUCTION NEDERLAND BV
NL	E02	-	CENTRICA PRODUCTION NEDERLAND BV
NL	E04	-	CENTRICA PRODUCTION NEDERLAND BV
NL	E05	-	CENTRICA PRODUCTION NEDERLAND BV

LEGEND

- Dogger Bank Zone
- Tranche boundary
- Dogger Bank Teesside A
- Dogger Bank Teesside B
- Dogger Bank Teesside A & B Export Cable Corridor
- Temporary works area
- Currently licenced blocks
- Cygnus gas field development
- 28th blocks on offer
- 27th round application
- Blocks relinquished since 27th
- 27th round provisional awards
- UKCS quad
- UKCS block
- NLCS quad
- International boundary

Other North Sea blocks

- Exploration licence
- Production licence
- Application exploration licence
- Application production licence

0 10 20 40
Kilometres

Data Source:
Oil & Gas data © DECC 2014
International Oil & Gas data © Danish Energy Agency, 2014, TNO Geological Survey of the Netherlands, 2014 and Landesamt für Bergbau, Energie und Geologie, 2014
Background bathymetry image derived in part from TCarta data © 2009

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.3 Oil and gas license blocks

VER	DATE	REMARKS	Drawn	Checked
1	10/05/2013	Draft	FK	PT
2	03/10/2013	PEI3	JE	PT
3	06/02/2014	Pre-DCO Submission	LW	TR

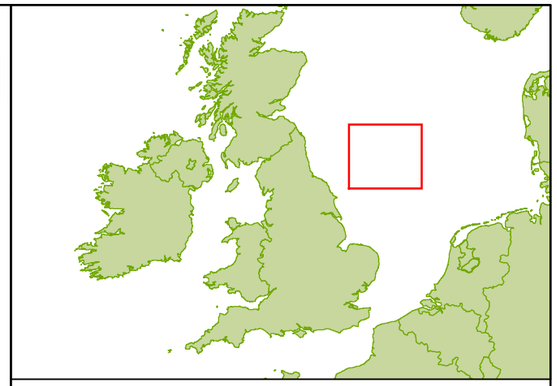
DRAWING NUMBER:

F-OFL-MA-575

SCALE	1:1,500,000	PLOT SIZE	A3	DATUM	WGS84	PROJECTION	UTM31N

FOREWIND

Block Number	Licence Number	Operator
36/28	P1828	CENTRICA NORTH SEA GAS LIMITED
36/29	P1828	CENTRICA NORTH SEA GAS LIMITED
38/10	P1829	NEXEN PETROLEUM U.K. LIMTED
39/6	P1829	NEXEN PETROLEUM U.K. LIMTED
39/7	P1829	NEXEN PETROLEUM U.K. LIMTED
42/10	P1630	RWE DEA UK SNS LIMITED
44/4a	P1899	CENTRICA NORTH SEA GAS LIMITED
44/5	P1899	CENTRICA NORTH SEA GAS LIMITED
45/1	P1899	CENTRICA NORTH SEA GAS LIMITED



LEGEND

- Dogger Bank Zone
- Tranche boundary
- Dogger Bank Teesside A
- Dogger Bank Teesside B
- Dogger Bank Teesside A & B Export Cable Corridor
- Temporary works area
- Blocks considered in HRA screening
- Currently licenced blocks
- International boundary

Oil and gas fields

- Gas, producing
- Gas, production ceased
- Gas, under development
- Oil, production ceased

0 5 10 20
Kilometres

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

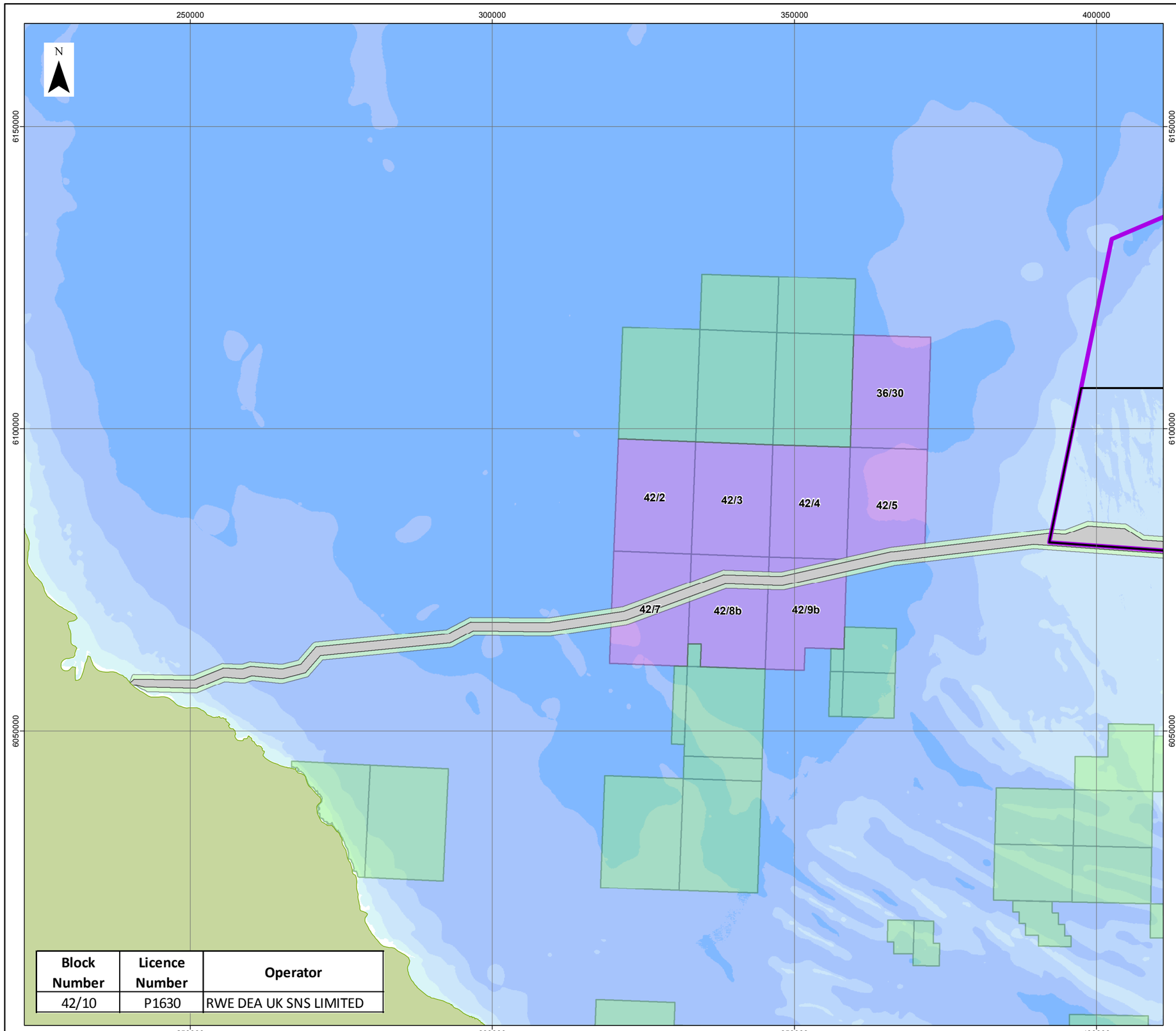
Figure 4.4 Oil and gas blocks considered in HRA screening

VER	DATE	REMARKS	Drawn	Checked
1	10/05/2013	Draft	FK	PT
2	04/10/2013	PEI3	JE	PT
3	06/02/2014	DCO Submission	LW	TR

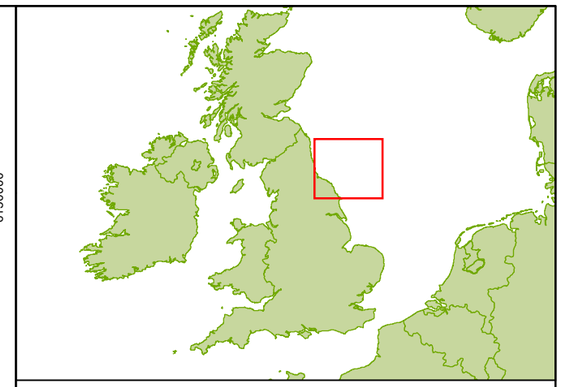
DRAWING NUMBER: **F-OFL-MA-576**

SCALE	1:700,000	PLOT SIZE	A3	DATUM	WGS84	PROJECTION	UTM31N

FOREWIND



Block Number	Licence Number	Operator
42/10	P1630	RWE DEA UK SNS LIMITED



LEGEND

- Dogger Bank Zone
- Tranche boundary
- Dogger Bank Teesside A & B Export Cable Corridor
- Temporary works area
- Blocks considered in HRA screening
- Currently licenced blocks

0 5 10 20

Kilometres

Data Source:
Oil & Gas data © DECC 2014
Background bathymetry image derived in part from TCarta data © 2009

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.5 Dogger Bank Teesside A & B export cable corridor interaction with oil and gas licence blocks

VER	DATE	REMARKS	Drawn	Checked
1	15/08/2013	Draft	FK	PT
2	03/10/2013	PEI3	JE	PT
3	06/02/2014	DCO Submission	LW	TR

DRAWING NUMBER:

F-OFL-MA-577

SCALE	1:650,000	PLOT SIZE	A3	DATUM	WGS84	PROJECTION	UTM31N

FOREWIND

4.4.8. Currently licenced blocks 44/4a, 44/5 and 45/1(developer - Centrica North Sea Gas Ltd (CNSGL)) overlap with the southern boundary of Dogger Bank Teesside A. The eastern boundary of Dogger Bank Teesside A is adjacent to Dutch exploration block E01 and a distance 39km from exploration block E03 and 13.6km from E04 (developer – Centrica Production Nederland B.V.(CPNVP)) (**Figure 4.3**). CPNVP is currently developing exploration plans for these blocks and once the results are available, plans for future exploration and potential development of the area will be formulated.

4.4.9. All licence blocks within the Dogger Bank Teesside B boundary have been relinquished since the 27th round and the Dogger Bank Teesside A & B Export Cable Corridor is overlapped by a small part of the northern section of licenced block 42/10 (developer - RWE Dea UK SNS Ltd).

4.4.10. The assumption is that some of the licenced blocks could be subject to seismic surveys in the future. Under current legislation operators of licence blocks are required to apply for consent 28 days before such a survey can take place. CNSGL is currently conducting a seismic survey over blocks 44/4a, 44/5 and 45/1. Once the results of this seismic survey are available, CNSGL will formulate its plans for future exploration and development of the area.

Existing oil and gas infrastructure

4.4.11. Both surface and subsurface infrastructure may be associated with oil and gas activity (**Figure 4.6**). The main types of surface infrastructure include: platforms; floating production, storage and offloading (FPSO) vessels; and drilling rigs (jack-up and semisubmersible).

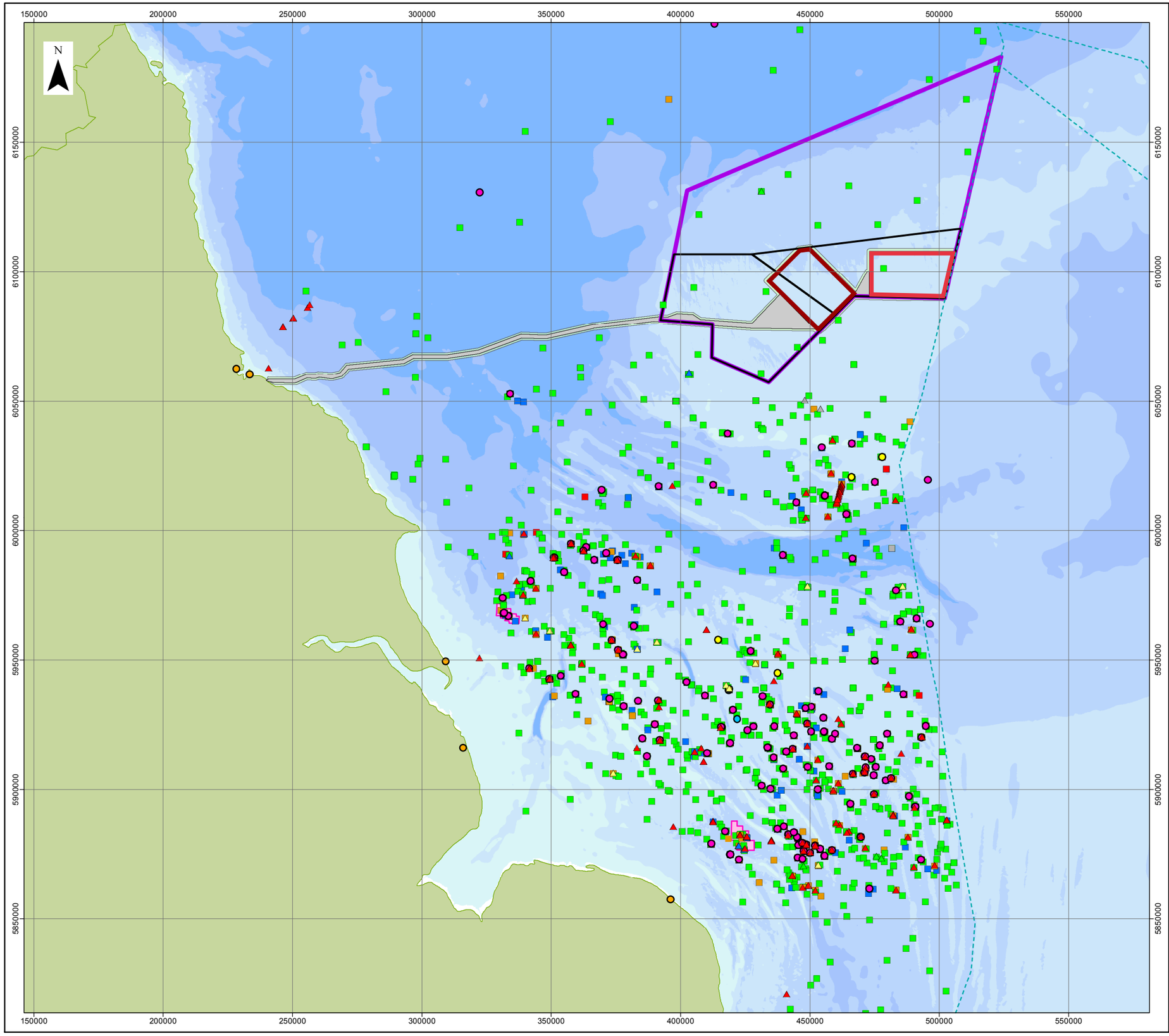
4.4.12. There is currently no surface infrastructure within either Dogger Bank Teesside A or Dogger Bank Teesside B. The active platforms are closer to Dogger Bank Teesside B and include:

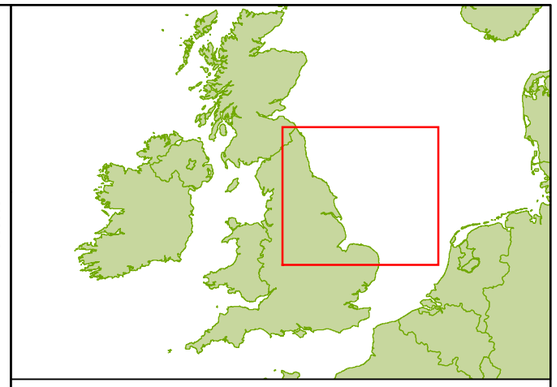
- The Cavendish platform; approximately 53km southwest of Dogger Bank Teesside B;
- The Munro platform; approximately 45km south of Dogger Bank Teesside B; and
- The Tyne platform; approximately 45km south east of Dogger Bank Teesside B.

4.4.13. Subsea infrastructure includes wells (production, completed, suspended, or plugged and abandoned), subsea trees, subsea templates and subsea manifolds. Within the two project areas there is one plugged and abandoned well located to the south of the northern boundary of Dogger Bank Teesside A and two outside the southern boundary of Dogger Bank Teesside B. There are also two plugged and abandoned wells to the south of the Dogger Bank Teesside A & B Export Cable Corridor (**Figure 4.6**).

Summary of oil and gas activity

4.4.14. Although there is likely to be increased areas available for licence and exploration in the future, most of the oil and gas activity is concentrated to the south of Dogger Bank Teesside A & B.





LEGEND

- Dogger Bank Zone
- Tranche boundary
- Dogger Bank Teesside A
- Dogger Bank Teesside B
- Dogger Bank Teesside A & B Export Cable Corridor
- Temporary works area
- Gas storage lease
- International boundary

Subsurface infrastructure

- Abandoned
- Active
- Not in use
- Precommission
- Proposed

Surface infrastructure

- FPSO, active
- FPSO, not in use
- FPSO, precommission
- Monitor buoy, active
- Platform, abandoned
- Platform, active
- Platform, not in use
- Platform, precommission
- Platform, proposed
- SBM, active
- Terminal, active

Wells

- Unknown
- Completed
- Drilling
- Plugged and abandoned
- Suspended

0 10 20 40
Kilometres

Data Source:
Oil & Gas data © DECC 2013
Background bathymetry image derived in part from TCarta data © 2009

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.6 Existing oil and gas infrastructure

VER	DATE	REMARKS	Drawn	Checked
1	16/08/2013	Draft	FK	PT
2	03/10/2013	PEI3	JE	PT
3	06/02/2014	DCO Submission	LW	TR

DRAWING NUMBER:

F-OFL-MA-578

SCALE	PLOT SIZE	DATUM	PROJECTION
1:1,500,000	A3	WGS84	UTM31N

FOREWIND

4.5. Underground coal gasification

4.5.1. UCG is the in-situ conversion of coal, into a synthetic gas that can be processed to provide a variety of fuels. The process requires wells to be drilled into coal seams, with an intake well for oxidants (water and/or oxygen) and an out-take well for extracting the gas (UCG 2012).

4.5.2. Following an EU trial in the 1990's, supported by the then Department of Trade and Industry (DTI), it was proven that UCG is feasible in European coal seams. It was concluded that there was potential for coal reserves in the UK to be utilised this way, especially considering the large quantities of offshore coal that are potentially available (DECC 2012b).

4.5.3. From oil and gas drilling, offshore coal is known to exist over vast areas of the North Sea. Prime areas of coal, accessible from the shoreline, lie along the Northumberland, Lincolnshire and Norfolk coasts. Consequently, the UK coal resource close to shore and offshore could provide a long term gas supply (DTI 2004). In 2009 and 2010 the Coal Authority received applications for, and granted, some 14 conditional nearshore and offshore UCG licences.

4.5.4. Importantly, the conditional licences enable prospective operators to secure the rights to the coal while projects are developed, but do not permit UCG operations to commence until all other rights and permissions are in place.

4.5.5. Within the study area there are six conditional licence areas to the north of the Dogger Bank Teesside A & B Export Cable landfall (**Figure 4.2**). The nearest of these is 'Sunderland Offshore' which is 37km from the cable landfall and owned by Clean Coal Ltd (CCL). Others including Lynemouth, Blyth, Tynemouth, Loughton licence areas are owned by Five Quarters Ltd a consortium including Newcastle University (see **Table 4.2** for location distances).

4.5.6. More recently a consortium of B9 Coal, AFC Energy and Linc Energy are planning to develop the first onshore UCG operation using Rio Tinto Alcan's Lynemouth plant in Northumberland as a potential site for the plant. The aim is to produce 500 MW using technology which will enhance the efficiency conversion of coal to electricity, whilst at the same time enabling in excess of 90% carbon capture. As yet no UCG licence has been issued.

4.5.7. Further south the 'Holderness Offshore' license area runs south down the coast from the Dogger Bank Creyke Beck cable landfall area (**Figure 4.2**). This area is licenced to Europa Oil and Gas Resources Ltd, who gained a three year conditional licence in 2010 to develop a project (but not to operate). There are a further two licences within the area, one within the Humber ('Humberside Coastal Area') and one south of the Humber ('South Humber Offshore'). Details of the licenses are given in **Table 4.2**.

4.5.8. Forewind has consulted with Europa Oil and Gas Resources Ltd with regard to the licence area along the Holderness coast. At that point in time Europa were not able to provide details of the most likely infrastructure required for the project. As a result, Forewind agreed to continue engaging with Europa through the consent process to ensure that any new information was shared between the companies and could be considered as and when available.

Table 4.2 Conditional UCG licences within and nearby the study area.

Licence area	Licensee	Distance from Dogger Bank Teesside A & B Export Cable landfall
Sunderland	Clean Coal Ltd (CCL)	37
Tynemouth	Five Quarters Ltd	49
Blyth		59
Lynemouth		67
Loughton		75
Holderness Offshore	Europa Oil & Gas Resources Ltd / Oxford Energy Consulting Ltd	85
Humberside Coastal	East Coast Energy Ltd	113
South Humberside Offshore	Europa Oil & Gas Resources Ltd / Oxford Energy Consulting Ltd	143

4.6. Aggregate extraction

4.6.1. Marine aggregate extraction is a UK licenced operation and is of national importance. Although marine aggregate extraction sites occur within the study area, the majority of licensed aggregate areas are located close to the Humber Estuary and The Wash, to the south of the Dogger Bank Zone. Apart from the areas mentioned below, other aggregate sites are over 100km distant from Dogger Bank Teesside A & B and are, therefore, scoped out of further assessment.

4.6.2. There are three sites of relevance to Dogger Bank Teesside A & B on account of their proximity to the development area:

- Application Area 466/1 (operator - CEMEX UK Marine Ltd) is approximately 65km and 28km respectively to the northwest of the northern boundary of Dogger Bank Teesside A & B. The decision is expected soon on the application to extract up to 3 million tonnes of sand and gravel over an initial 15 year period, although this may be extended. CEMEX estimates that 200,000 tonnes/year will be extracted in the first five years, increasing to 600,000 tonnes/year thereafter.
- Application areas 485/1 and 485/2 (also CEMEX sites), approximately 90km and 86km respectively to the southwest of the western boundary of Dogger Bank Teesside A and 63km and 59km respectively to the west of Dogger Bank Teesside B. These application areas are also 33km and 32km respectively to the south of the Dogger Bank Teesside A & B Export Cable Corridor (**Figure 4.7**)

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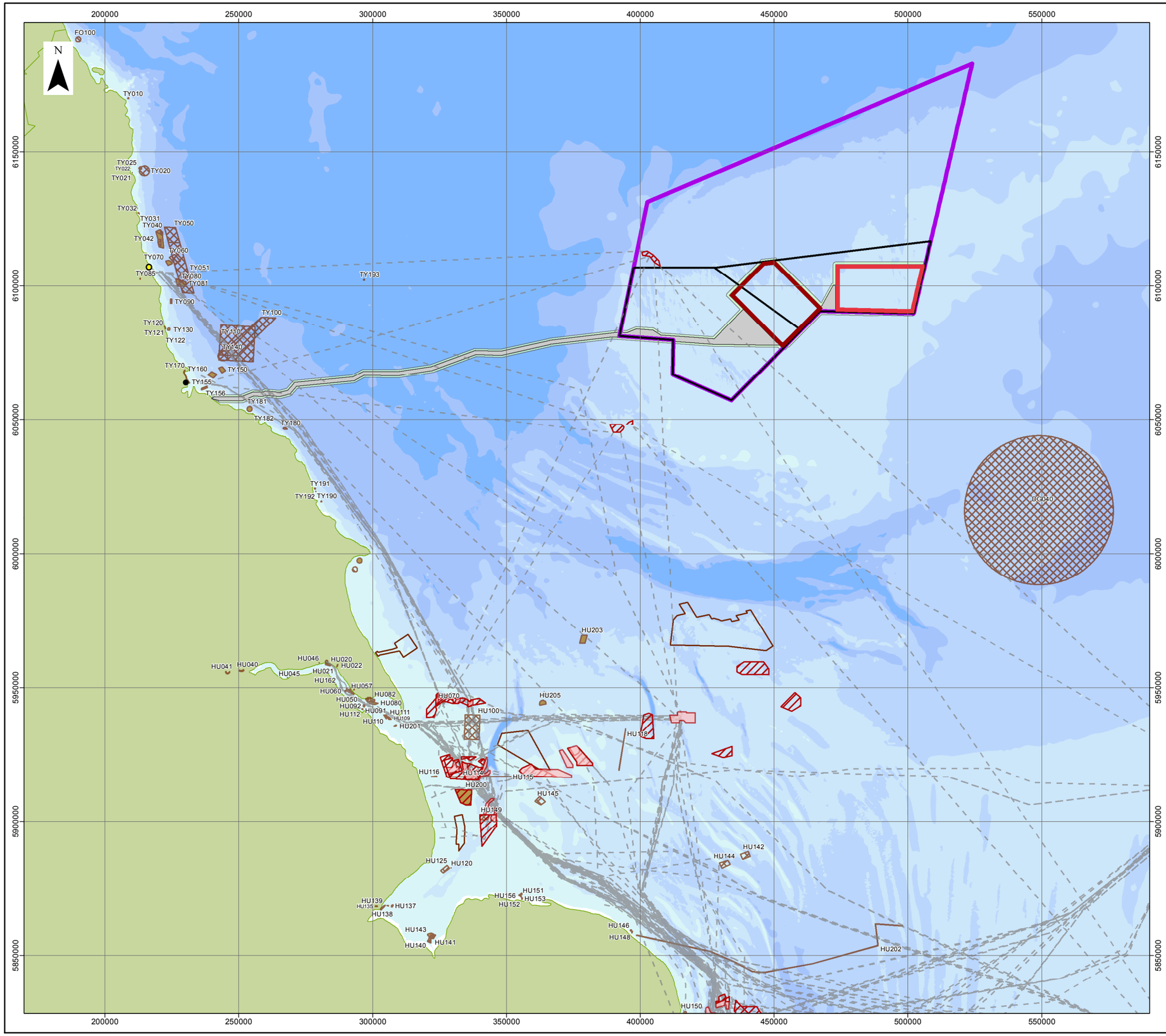
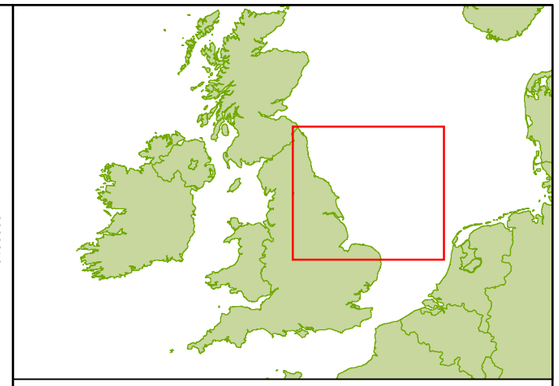




LEGEND

- Dogger Bank Zone
- Tranche boundary
- Dogger Bank Teesside A
- Dogger Bank Teesside B
- Dogger Bank Teesside A & B Export Cable Corridor
- Temporary works area
- Aggregate licence area
- Aggregate application area
- Aggregate dredger transit route

Marine disposal site

- Closed
- Open
- Wind farm disposal sites
- Tees aggregate wharf
- Tyne aggregate wharf

0 10 20 40
Kilometres

Data Source:
Transit Routes © BMAPA, 2010
Aggregate Data © The Crown Estate, 2014
Marine Disposal Sites © Cefas, 2014
Background bathymetry image derived in part from TCarta data © 2009

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.7 Aggregate and marine disposal activity

VER	DATE	REMARKS	Drawn	Checked
1	15/08/2013	Draft	FK	PT
2	03/10/2013	PEI3	JE	PT
3	14/02/2014	Pre-DCO Submission	LW	TR

DRAWING NUMBER:

F-OFL-MA-579

SCALE	1:1,450,000	PLOT SIZE	A3	DATUM	WGS84	PROJECTION	UTM31N

FOREWIND

4.6.3. Applications for marine licences can take up to seven years for decisions to be made although CEMEX has advised that a decision on the 466/1 application is expected in the near future. The application is subject to Appropriate Assessment under the Habitats Regulations on account of the application area lying within the boundary of the Dogger Bank candidate Special Area of Conservation (cSAC).

4.6.4. **Figure 4.7** shows the potential dredger transit routes for vessels moving between aggregate sites and wharves along the coast and overseas. The key UK wharves serving the Humber Region are located on the Tyne (Tyne, Jarrow and Gateshead), Tees (Tees and Tees Port) and Humber rivers (Hull).

4.6.5. There are no dredger routes which intersect with Dogger Bank Teesside A & B. The Dogger Bank Teesside A & B Export Cable Corridor is crossed by approximately 10 dredger routes (**Figure 4.7**) although these may be indicative routes only since marine aggregate companies will propose routes as part of the application process.

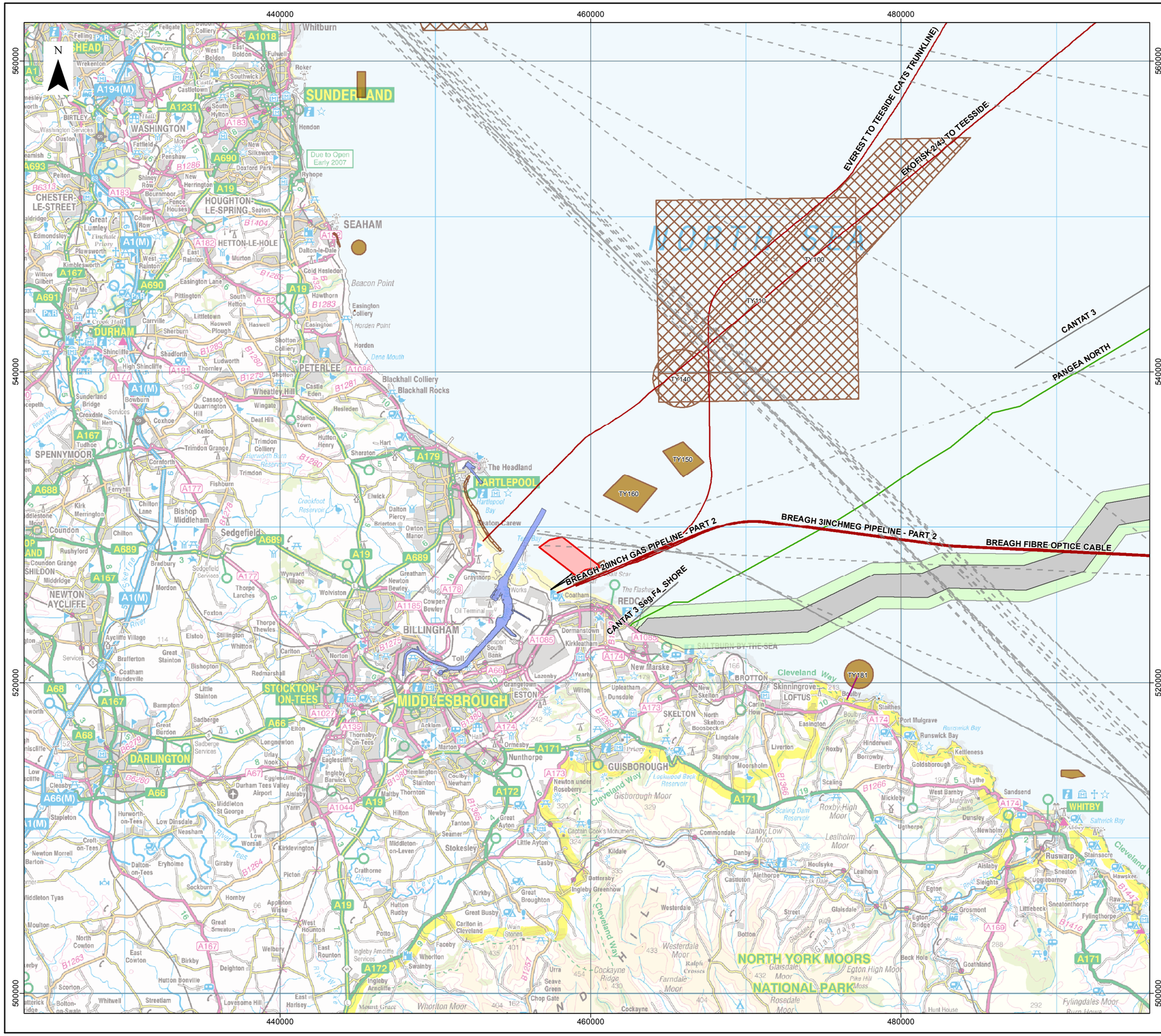
4.6.6. CEMEX has indicated that, on average, one dredger is expected to visit each site once a week, working on a six hour period to load 7,000 tonnes with one cargo movement every three days. Cemex has also indicated that the occupancy of a site will be between 1 - 3% in any one year. Dredger transit routes and activity are discussed further in **Chapter 16**.

4.7. Marine disposal sites

4.7.1. Material from capital and maintenance dredging near coastal and urban locations is deposited in marine disposal sites which tend to be located within 22km (12nm) of the coast. Marine licences for disposal relate to either the UK territorial limits set at 22km (12nm) or out to the continental shelf. Within the Dogger Bank Teesside A & B boundaries there are no disposal sites (**Figure 4.7**). However the Dogger Bank Teesside A & B Export Cable landfall site lies close to urban development of Teesside and there are several marine disposal sites within the vicinity. There are two open disposal sites to the north of the Dogger Bank Teesside A & B Export Cable Corridor TY160 and TY150**.** The closest of these TY160 is a distance of 6.9km from the Dogger Bank Teesside A & B Export Cable landfall. The CPL disposal site is located 3km from the Dogger Bank Teesside A & B Export Cable Corridor (**Figure 4.8**).

4.8. Subsea cables and pipelines

4.8.1. Within the boundaries of Dogger Bank Teesside A & B there are no subsea cables or pipelines. However one active telecommunications cable, TATA Northern Europe (Operator TATA Communications) is in close proximity to the southern corner of the boundary for Dogger Bank Teesside B (**Figure 4.9**). In relation to the Dogger Bank Teesside A & B Export Cable Corridor there are several cables and pipelines which are relevant to the assessment. The following table (**Table 4.3**) indicates the cables and pipelines of relevance to Dogger Bank Teesside A & B. Within the proposed landfall area there are three cables, the active CANTAT 3 F4 and two out of service cables.



LEGEND

- Dogger Bank Teesside A & B Export Cable Corridor
- Temporary works area
- Teesside offshore wind farm
- Wind farm export cable route
- Maintenance dreding area
- Aggregate dredger transit route

Marine disposal site
- Closed
- Open

Subsea pipeline
- Active
- Cleveland Potash intake/outfall pipeline

Subsea cable
- Active
- Out of service

0 2.5 5 10
Kilometres

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.8 Aggregates and other marine activities within the Dogger Bank Teesside A & B Export Cable landfall area

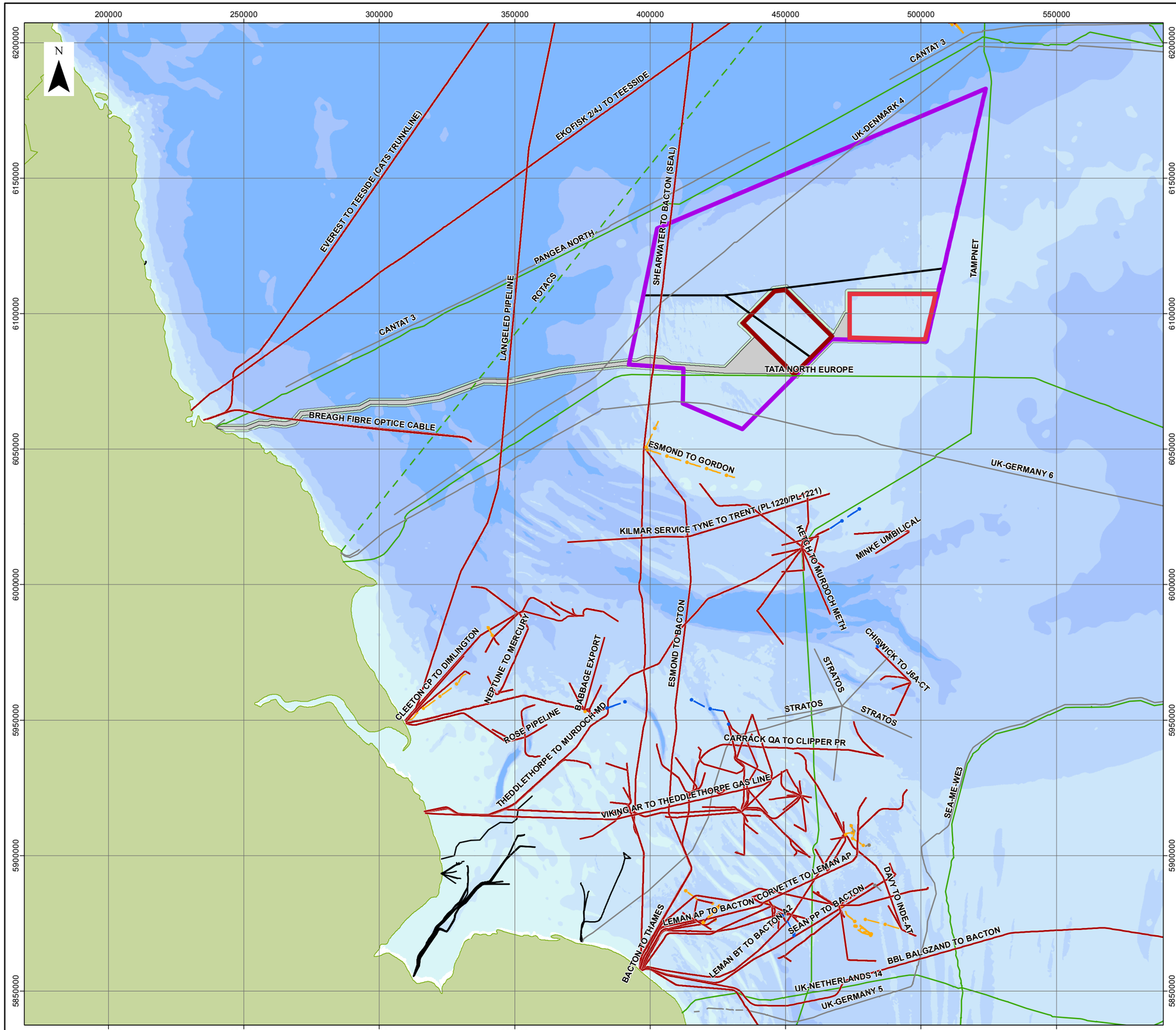
VER	DATE	REMARKS	Drawn	Checked
1	15/08/2013	Draft	GC	TR
2	03/10/2013	PEI3	JE	TR
3	14/02/2014	DCO Submission	LW	TR

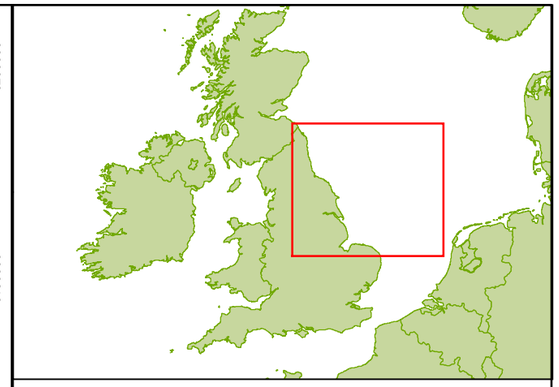
DRAWING NUMBER:

F-OFL-MA-580

SCALE	1:250,000	PLOT SIZE	A3	DATUM	OSGB	PROJECTION	BNG

FOREWIND





LEGEND

- Dogger Bank Zone
- Tranche boundary
- Dogger Bank Teesside A
- Dogger Bank Teesside B
- Dogger Bank Teesside A & B Export Cable Corridor
- Temporary works area
- Round 1 and 2 export cable

Subsea cable
- Active
- Out of service
- Proposed

Subsea pipeline
- Active
- Not in use
- Precomission
- Removed

0 10 20 40
Kilometres

Data Source:
Cables © KIS-ORCA, 2013 and The Crown Estate, 2013
Pipelines © UK Deal 2013,
Background bathymetry image derived in part from TCarta data © 2009.

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.9 Subsea cables and pipelines

VER	DATE	REMARKS	Drawn	Checked
1	15/08/2013	Draft	FK	PT
2	03/10/2013	PEI3	JE	PT
3	06/02/2014	Pre-DCO Submission	LW	TR

DRAWING NUMBER:

F-OFL-MA-581

SCALE	1:1,450,000	PLOT SIZE	A3	DATUM	WGS84	PROJECTION	UTM31N

FOREWIND

Table 4.3 Distance of subsea cables and pipelines to the cable landfall

Infrastructure	Operator	Distance from Dogger Bank Teesside A & B Export Cable landfall (km)	Status
Teesside offshore windfarm export cable	EDFER	5.3	Active
CANTAT 3 F4 (telecommunications cable)	BT	0.6	Active – Redcar to Europe
Pangea North UK/DMK (telecommunications cable)	Alcatel	0.5	Out of service - connected to Denmark
UK-Denmark 4- Seg 2 (telecommunications cable)	BT subsea	22km (12nm) offshore	Out of service – connected to Denmark
VSNL North Europe (TATA)	TATA Communications	3.7	Active – from Scarborough to N. Europe
UK-Germany 6 (telecommunications cable)	Cable and wireless/BT subsea	15	Active – Scarborough to Germany
Everest to Teesside (CATS Trunkline) (gas pipeline)	BP/SSE	11	Active – Connects Everest field to Teesside
Breagh (gas pipeline)	RWE	5.6	In construction – connects Breagh field to Coatham sands
Langeled (gas pipeline)	Gasscon	128	Active – Easington to Norway
Shearwater Elgin Area Line (SEAL) (gas pipeline)	Shell-UK	157	Active – connects Shearwater and Elgin platforms to Bacton
Esmond to Forbes (gas pipeline)	BHP-Billiton	23.5 (from cable corridor not landfall)	Out of service – connected from Esmond to Forbes fields

4.9. Capital and maintenance dredging

4.9.1. The location of maintenance dredging is shown in **Figure 4.8** and covers the whole of the Tees Estuary extending 5km out from the coast 8.8km to the north of the Dogger Bank Teesside A & B Export Cable landfall. There are no capital dredging sites in the area.

4.10. Unexploded ordnance

4.10.1. Activities during wartime may have resulted in a variety of UXO being left in the region, especially along the coast due to the laying of minefields as part of invasion protection measures. In addition munitions may also be present offshore as a result of naval vessels being sunk during World Wars I and II as well as aerial ordnance. UXO is considered in **Chapter 19** and is not discussed further in this chapter.

5. Assessment of Impacts – Worst case Definition

5.1. General

5.1.1. This section establishes the realistic worst case scenario for each category of impact as a basis for the subsequent impact assessment. This involves both a consideration of the construction scenarios (i.e. the manner in which Dogger Bank Teesside A & B will be built out), as well as the particular design parameters of each project that define the Rochdale Envelope[2].

5.1.2. Full details of the range of development options being considered by Forewind are provided within **Chapter 5 Project Description**. For the purpose of the other marine users impact assessment, the key project parameters which form the realistic worst case are set out in **Table 5.1**.

5.1.3. Only those design parameters with the potential to influence the level of impact are identified. Therefore, if the design parameter is not described, it is not considered to have a material bearing on the outcome of the assessment.

5.1.4. The realistic worst case scenarios identified here are also applied to the cumulative impact assessment. When the worst case scenarios for the project in isolation do not result in the worst case for cumulative impacts, this is addressed within the cumulative section of this chapter (see Section 10) and summarised in **Chapter 33 Cumulative Impact Assessment**.

5.2. Construction scenarios

5.2.1. There are a number of key principles relating to how the projects will be built, and that form the basis of the Rochdale Envelope (see **Chapter 5**). These are:

- The two projects may be constructed at the same time, or at different times;
- If built at different times, either project could be built first;
- If built at different times, the duration of the gap between the end of the first project to be built, and the start of the second project to be built may vary from overlapping, occurring in series or having gaps between projects;
- Offshore construction will commence no sooner that 18 months post consent, but must start within seven years of consent (as an anticipated condition of the development consent order); and
- Assuming a maximum construction period per project of six years, and taking the above into account, the maximum construction period over which the construction of Dogger Bank Teesside A & B could take place is 11 years and six months.

[2] As described in **Chapter 5** the term 'Rochdale Envelope' refers to case law (R.V. Rochdale MBC Ex Part C Tew 1999 "the Rochdale case"). The 'Rochdale Envelope' for a project outlines the realistic worst case scenario or option for each individual impact, so that it can be safely assumed that all lesser options will have less impact.

5.2.2. To determine which offshore construction scenario is the worst realistic case for a given receptor, two types of effect exist with the potential to cause a maximum level of impact on a given receptor:

- Maximum duration effects; and
- Maximum peak effects.

5.2.3. To ensure that the Rochdale Envelope incorporates all of the possible construction scenarios (as outlined in **Chapter 5**), both the maximum duration effects and the maximum peak effects have been considered for each receptor. Furthermore, the option to construct each project in isolation is also considered ('Build A in isolation' and 'Build B in isolation'), enabling the assessment to identify any differences between the two projects. The three construction scenarios for Dogger Bank Teesside A & B considered within the other marine users assessment are, therefore:

- Build A or Build B in isolation;
- Build A and B concurrently – provides the worst 'peak' impact and maximum working footprint; and
- Build A, then Build B (sequential) – provides the worst duration of impact.

5.2.4. Any differences between the two projects, or differences that could result from the manner in which the first and the second projects are built (concurrent or sequential and the length of any gap) are identified and discussed in the impact assessment section of this chapter (Section 6, 7 and 8).

5.2.5. For each potential impact only the worst case construction scenario for two projects is presented, i.e. either concurrent or sequential. The justification for what constitutes the worst case is provided, where necessary, in Section 6.

5.2.6. As such, the construction scenarios presented within the impact assessment are:

- Single project (Dogger Bank Teesside A or Dogger Bank Teesside B in isolation); and
- Two projects – concurrent or sequential (Dogger Bank Teesside A & B together).

5.3. Operational scenarios

5.3.1. **Chapter 5** provides details of the operational scenarios for Dogger Bank Teesside A & B. Flexibility is required to allow for the following three scenarios:

- Dogger Bank Teesside A to operate on its own;
- Dogger Bank Teesside B to operate on its own, and
- For Dogger Bank Teesside A and Dogger Bank Teesside B to operate concurrently.

5.3.2. For the other marine users' assessment, unless stated, there is not considered to be a material difference between either Dogger Bank Teesside A or Dogger Bank Teesside B operating on their own. As such, only one assessment for the

single wind farm scenario is presented and is considered representative for whichever project is operating in isolation.

5.4. Decommissioning scenarios

5.4.1. **Chapter 5** provides details of the decommissioning scenarios for Dogger Bank Teesside A & B. Exact decommissioning arrangements will be detailed in a Decommissioning Plan (which will be drawn up and agreed with DECC prior to construction); however, for the purpose of this assessment it is assumed that decommissioning of Dogger Bank Teesside A & B could be conducted separately, or at the same time.

5.5. Realistic worst case Scenario

5.5.1. **Table 5.1** identifies the key design parameters for the impact assessment. The parameters identified have been derived from a desktop review and through consultation with stakeholders.

5.5.2. Forewind are considering a range of wind turbine sizes:

- Six megawatt (6MW) with a maximum of 200 wind turbines in each of Dogger Bank Teesside A & B (total of 1.2GW capacity); and
- 10MW+ with a maximum of 120 wind turbines in each project (total capacity 1.2GW per project).

5.5.3. Both the above scenarios are considered within the realistic worst case scenario identification table (**Table 5.1**).

Table 5.1 Key parameters forming the realistic worst case scenarios for the assessment of impacts on other marine users

Impact	Key design parameters forming the realistic worst case scenarios	Rationale
Construction		
General disruption or damage to activities or assets of other marine users (including, renewable energy projects, CCS, oil and gas, aggregates and subsea cables)	**Maximum footprint** (per project unless stated): Total offshore zone area (km^2): 8639 Dogger Bank Teesside A wind farm area (km^2): 560.11 (6.5% total area) Dogger Bank Teesside B wind farm area (km^2): 593.21 (6.9% total area) Wind turbines: 200 (6MW) 120 (10MW) Met Masts: up to 5 Collector stations: up to 4 Converter stations: 1 Accommodation platforms; up to 2 Mooring buoys: up to 10 Safety zones to be implemented as per best industry standard at time of construction Dogger Bank Teesside A & B Export Cable Corridor area of disturbance: 1.57km^2 ***Inter-array cables*** (per project unless stated): Length of inter-array cabling: 950km (with 2 platforms) Length of inter-platform cabling: 320km Burial depth: 0 to 3.0m Array cable trench maximum width of disturbance: 10m (via jetting) ***Export cables***: Two pairs of HVDC Export cables (550kV) Burial depth: 0 to 3m Dogger Bank Teesside A & B length of export cable (unbundled) from exit point to landfall: 573km and 484km respectively Dogger Bank Teesside A length of export cable in zone to exit point: 103km Dogger Bank Teesside B length of export cable in zone to exit point: 64km Export cable trench maximum width of disturbance: 10m (via jetting)	This represents the scenarios which would cause the maximum disruption for the longest period of time. This includes such activities which could adversely affect the activities of other marine users namely: • Overlapping of other projects by the Dogger Bank Teesside A & B Export Cable Corridor or project site; • Disruption to services such as transit routes and personnel movements which may affect safety (i.e. navigation and buffer zones around structures); • Potential adverse impact of construction of structures such as wind turbines and ancillary structures. This is related to number, location and foundation type; • Excavation of inter-array cables, layout and properties; • Cable crossings and pipelines; and • Suspended sediments.
	Maximum temporal footprint (per project unless stated): Duration of offshore construction: six years	

Impact	Key design parameters forming the realistic worst case scenarios	Rationale
	Maximum levels of activity (per project unless stated): Maximum duration of simultaneous construction of Dogger Bank Teesside A & B: six years Number of construction vessels on site at any one time: 66 (132 in total if both A and B constructed together) Construction vessel round trips to port: 5150 (6MW) and 4360 (10MW) over six years	
	Subsea cable and pipeline crossings: ***Dogger Bank Teesside A & B***:None ***Dogger Bank Teesside A & B Export Cable Corridor:*** 4 crossings Langeled and SEAL pipelines For further details see **Chapter 5 Project Description**	
Operation		
General disruption or damage to activities or assets of other marine users (including, renewable energy projects, CCS, oil and gas, aggregates and subsea cables)	**Maximum spatial footprint:** as for construction, excluding safety zones (not required during routine operation) Vessel movements (per project) Maximum number of vessel on site at any one time: 26 Operation and maintenance vessel round trips to port per year: 730 (6MW turbine size) **Helicopter movements (round trips per year):** Helicopter accommodation and turbine transfers per year: 900 (shore to accommodation) and 6000 (technicians to turbines) **Subsea cable and pipeline crossings:** As for construction ***Proximity:*** Separation distances of between 500m and 750m from existing operational infrastructure and wind turbines have been proposed by Forewind For further details see **Chapter 5 Project Description**	This scenario represents the greatest potential disruption to other marine users during operational activities including: • Footprint of the actual project structures • From Dogger Bank Teesside A & B; • Maintenance and repair vessel activity and anchoring; • Helicopter round trips for personnel; • Use of port services; and • Crossings and proximity of cables and pipelines during operation and maintenance.
Decommissioning		

Impact	Key design parameters forming the realistic worst case scenarios	Rationale
General disruption or damage to the activities or assets of other marine users (including other renewable energy, CCS, oil & gas, aggregates and subsea cables).	All project components removed (see **Chapter 5 Project Description**).	Decommissioning arrangements will be detailed in a Decommissioning Plan, which will be drawn up and agreed with DECC prior to construction.

6. Assessment of Impacts during Construction

6.1. General

6.1.1. The construction scenarios for Dogger Bank Teesside A & B are set out as described in Section 5.2 to allow for flexibility in the programme. This flexibility is taken into account in the assessment of impacts during the construction phase.

6.2. Other renewable energy projects

6.2.1. Other renewable energy projects could be affected during construction by:

- General disruption, in the event that construction activities overlap;
- Disruption of, and increased pressure on, port services due to construction activity;
- Safety of navigation; and
- Overlap in aviation (helicopter) routes.

6.2.2. Navigational issues are addressed in **Chapter 16**, including any effects on existing commercial and recreational shipping relating to an increase in vessel movements during construction of Dogger Bank Teesside A & B.

6.2.3. Aviation matters are considered in **Chapter 19.**

Dogger Bank Teesside A or Dogger Bank Teesside B in isolation

6.2.4. There is no spatial overlap between Dogger Bank Teesside A & B and any other renewable project within the study area which are currently in the planning process (**Figure 4.1** and **Table 4.1**). The closest major offshore wind farm development to Dogger Bank Teesside A & B is the Round 3 Hornsea Zone (Optimus project), which is located 112km from the southern boundary of Dogger Bank Teesside A and 95km from Dogger Bank Teesside B (**Figure 4.1**). Teesside Offshore Windfarm is now operational. The cable corridor and the wind farm are in relatively close proximity to the Dogger Bank Teesside A & B Export Cable Corridor (Export Cable Corridor is a distance of 6.1km). There will be no overlap in construction activities between these two developments since Teesside Offshore Windfarm is close to being fully operational. Although the sensitivity of renewable projects is considered to be medium due to their national importance, the magnitude of any effect due to temporal overlap in construction activities is considered to be negligible given the considerable distance from the nearest planned project to either Dogger Bank Teesside A or Dogger Bank Teesside B. As a result the impact due to overlap of construction activity is considered to be **negligible.**

6.2.5. The potential for increased activity at ports associated with the development of other renewable projects is considered to be small since the other renewable project associated with the Teesside coastal area is Teesside Offshore

Windfarm, which is close to being fully operational and is already generating energy. The ports associated with Dogger Bank Teesside A & B have not yet been identified and therefore the potential effects cannot be specified. The capacity, infrastructure, geography and local cumulative effects of each port are important considerations in terms of identifying the level of impact and these factors will be taken into account when selecting servicing ports. On this basis adverse impacts are not anticipated.

6.2.6. The socio-economic benefits of the development on port services are discussed in **Chapter 22 Socio-economics**.

Dogger Bank Teesside A & B together or sequentially

6.2.7. Simultaneous construction could increase the magnitude of effect compared to construction in isolation through doubling the activities and demand for services at any one time. Alternatively simultaneous construction activities would extend the period of disruption from six years to a maximum of 11 years and six months.

6.2.8. Despite the potential for increased magnitude or duration of effect, the distance of Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor from other renewable projects in planning within the study area is considered to negate any adverse impact of construction activities. There is a potential overlap between operational activities for Teesside Offshore Wind Farm and construction activities for the Dogger Bank Teesside A & B Export Cable Corridor closer to the coast. The distance between both Export Cable Corridors is 6.1km and no interaction between both activities is anticipated. Therefore for both projects to be developed sequentially **no impact** is anticipated.

6.3. Carbon capture and storage

6.3.1. Carbon capture and storage (CCS) projects in the study area could be affected if construction activities at Dogger Bank Teesside A or Dogger Bank Teesside B overlap with such proposals.

Dogger Bank Teesside A or Dogger Bank Teesside B in isolation

6.3.2. The proposals for CCS projects in the study area include that proposed by the consortium named as Teesside Low Carbon (see Section 4.2). National Grid Carbon as one of the consortium is responsible for developing the CCS pipeline for this project shown in **Figure 4.2,** located 5.9km from the Dogger Bank Teesside A & B Export Cable landfall. However proposals for the CCS project in Teesside are still in the initial stages of planning and there is a high level of uncertainty in terms of the timing, location and nature of the project.

6.3.3. The distance of the Humber Gateway project to the cable corridor for Dogger Bank Teesside A & B is considered to be too great for any effects of construction to have an adverse effect on the project.

6.3.4. The possible storage sites for CO_2, namely the Esmond, Forbes and Gordon gas field complex (between 20 – 50km south of the Dogger Bank Teesside A & B Export Cable Corridor) is considered to be too great a distance from Dogger

Bank Teesside A & B, or the Dogger Bank Teesside A & B Export Cable Corridor for any adverse impacts to arise during construction activities.

6.3.5. Although the sensitivity of CCS projects is considered to be medium given their national importance, there is currently a lack of detail with regard the location and nature of the Teesside CCS project upon which to make an assessment of the impact. However Forewind is in discussions with NGC and other members of the consortium namely Progressive Energy to resolve any potential concerns regarding proximity of the HVDC cable and any proposed CO_2 pipeline. Given these precautionary considerations the magnitude of effect is assessed as low. Since such projects are of national importance the sensitivity is considered to be medium and the residual impact is therefore **minor adverse**.

Dogger Bank Teesside A & B together or sequentially

6.3.6. Simultaneous or sequential construction of Dogger Bank Teesside A & B would either increase the level of activity or the duration of the potential disruption. However given the discussions to resolve concerns as discussed in 6.3.5 it is considered that there will be no quantifiable additional impact with the 'build together' scenarios and the residual impact will remain as **minor adverse**.

6.4. Potash mining

6.4.1. Cleveland Potash Ltd operate a potash mine in the north-east coast of England, with workings extending down to 1,500m below ground level and as far as 7km under the North Sea. The mine licence area extends under the Dogger Bank Teesside A & B Export Cable Corridor at its northernmost extent. Forewind and Cleveland Potash Ltd are actively engaged in consultation with each other over interactions between the two developments.

6.4.2. The mine operates a seawater intake pipe with seawater used to clean and separate the mined material. The intake pipe is approximately 4km south of the nearshore portion of the Dogger Bank Teesside A & B Export Cable Corridor. Modelling has shown that the sediment plume which may be released during the excavation of the trench for burial of the Dogger Bank Teesside A & B export cable, may extend as far as the seawater intake pipe (see **Chapter 9 Marine Physical Processes** Section 4.5). Results from the modelling predict that in a worst case, the top 10m of the water column would have a maximum increase in suspended sediments of less than 6mg/l, with maximum increases in suspended sediments ranging from 22mg/l at 11m depth to 72mg/l at the seabed. These maximum increases in suspended sediment would be of a short duration, lasting in the region of hours. The maximum level is within the range of background levels and lower than those found during a storm event. The magnitude of the effect is therefore considered to be low. The potash mine is of national importance but the ability to tolerate the short term low level effect is high therefore the sensitivity is considered to be medium. The impact is therefore considered to be **minor adverse.**

6.4.3. Sediment plume dispersion modelling has also been carried out for the Dogger Bank Teesside Export Cable Corridor excavation in relation to the Cleveland Potash Ltd. disposal site. The results show that the maximum depth of deposition over the 30 day simulation period would be 0.5-1mm across the

whole site. At the end of the 30 day simulation period the model shows that the final deposition would be too small to be measured and therefore this potential effect not assessed futher.

6.5. Oil and gas activity

6.5.1. As identified in **Table 5.1,** oil and gas activities could be affected by construction in the following ways:

- General disruption in the event that construction activities overlap, including seismic surveys;
- Safety of navigation; and
- Overlap in aviation (helicopter) routes.

6.5.2. These issues were raised during the consultation phase. Safety of navigation and aviation issues are considered in **Chapter 16** and **Chapter 19** respectively**.** The issue of disruption is considered in the following sections.

Dogger Bank Teesside A or Dogger Bank Teesside B in isolation

6.5.3. Although there are planned and on-going oil and gas operations in licensed blocks overlapping with Dogger Bank Teesside A (44/4a, 44/5 and 45/4) and the Dogger Bank Teesside A & B Export Cable Corridor (42/10), Forewind is continuing to engage with oil and gas developers. A programme of consultation will continue throughout the life of the development in order to provide a platform for discussion with developers. This will ensure that with necessary planning and engagement, disruption due to construction will be avoided.

6.5.4. During the consultation phase, issues relating to disruption were raised by GDF Suez with respect to the development at the Cygnus gas field which is expected to come online in 2015. There was concern regarding the possibility that construction phases may overlap in the event of slippage for the first phase of the Cygnus development. In addition oil and gas seismic surveys could be affected if they coincided with the installation of wind turbine foundations using percussive piling techniques. It is possible that there may be data quality issues if such activities overlap. Forewind may also carry out seismic surveys, but since these are considered to be ‘shallow’ surveys for collection of data on the seabed and shallow subsurface layers they are unlikely to interact with deeper oil and gas surveys.

6.5.5. Although the potential magnitude of the effect is medium given the reason in Section 6.5.4 engagement between offshore wind farm developers and other marine users in order to find solutions to allow activities to co-exist is encouraged in the National Policy Statement (EN-3, DECC 2011). This has been undertaken by Forewind in the comprehensive consultation programme with the oil and gas industry. It is considered that with proper and effective consultation, advance notification of construction activities likely to involved high levels of noise the magnitude of effect will be reduced to low. In combination with the sensitivity of the receptor being considered to be medium since this is an industry of national importance the residual impact is anticipated to be **minor adverse**.

Dogger Bank Teesside A & B together or sequentially

6.5.6. A simultaneous construction scenario could double the level of activity at any one time and a sequential scenario would extend the overall period of any disruption. With continued engagement with stakeholders and effective measures being agreed to reduce the likelihood of any impacts, it is considered that there will not be any additional quantifiable impact under either of the 'build together' scenarios. The residual impact is anticipated to remain as **minor adverse**.

6.6. Aggregate extraction activity

6.6.1. Aggregate extraction activity could be affected during construction by:

- Increased sediment deposition within the licenced aggregate site via sediment plumes generated during foundation installation (primarily associated with Dogger Bank Teesside B); and
- Increased steaming times for dredgers to avoid construction Safety Zones and related increased risk of vessel collisions.

6.6.2. Shipping and navigation matters are assessed in **Chapter 16**.

Dogger Bank Teesside A or Dogger Bank Teesside B in isolation

6.6.3. The nearest marine aggregate application areas to Dogger Bank Teesside A & B are 466/1 (28km north west of Dogger Bank Teesside B) and 485/1 and 2 (63 and 58km south west of Dogger Bank Teesside B respectively) (**Figure 4.7**). There is the potential for sediment plumes generated during the construction of Dogger Bank Teesside B to lead to sediment deposition at varying distances from the source of the plume. If sediment deposition were to occur within the boundary of an aggregate Application Area, there could be time and cost implications relating to the greater amount of screening of aggregates which may be required. Screening relates to the gravel to sand ratio which can be adjusted to meet clients' needs which has time and cost implications as mentioned above (BMAPA 2007).

6.6.4. Sediment plume modelling was carried out as part of the marine physical processes assessment in order to predict the maximum depth of suspended sediment anticipated, the duration of effect and the direction and distance the deposition may occur.

6.6.5. Modelling was undertaken using a 3D model MIKE3-FM Mud Transport MT. The main driver for modelling was the sandeel habitat data, since the sensitivity of seabed habitats is not considered to be greater than moderate. Therefore the worst case location for the 24 foundations is in the western corner of Dogger Bank Teesside B. In this approach, the 24x12m monopile foundations, a set of inter-array cables connecting them and one export cable were all installed together within a 30-day period. For full details see **Chapter 9**.

6.6.6. The results of the sediment modelling detailed both the suspended sediment concentration in the lower 5m of water column and the sediment deposition on the seabed as a result of the plume. Predicted sediment concentrations in the bottom layer were presented in relation to the natural background concentration

of 2mg/l. Modelling indicates that within the confines of the 24 foundations and between 1km and 11km on either side of the cable route within the Dogger Bank Zone a maximum bottom layer suspended sediment concentration of greater than 200mg/l is predicted. However the concentration will reduce with distance from the foundations to a level of 2mg/l, up to 40km to the north and up to 40km south. Within the Dogger Bank Teesside A & B Export Cable Corridor maximum concentrations of 100-200mg/l occur in two small patches, near the coast and about 50km offshore. This reduces with distance from the Dogger Bank Teesside A & B Export Cable Corridor until they are predicted to be 2mg/l, up to 50km to the north and up to 45km south of the corridor (see **Chapter 10 Marine Water and Sediment Quality**).

6.6.7. Of interest to the assessment of the effects of wind farm construction on aggregate dredging is the potential for deposition of suspended sediment to affect the aggregate screening process as described in Section 6.6.3. The modelling studies predicted that the average deposition from the plume over the 30-day simulation period would be 1-5mm within the foundations and 10km to the north as well as in small patches along the Dogger Bank Teesside A & B Export Cable Corridor. The average deposition is predicted to decrease to less than 0.5mm along the remainder of the cable corridor, and is predicted to be zero in places.

6.6.8. Area 466/1 is 28km to the north west of Dogger Bank Teesside B which is outside the zone of influence for the sediment plume emanating from the foundations sited in Dogger Bank Teesside B and for the excavation of the Dogger Bank Teesside A & B Export Cable Corridor. Areas 485/1 and 485/1 being an average of 60km to the south west of Dogger Bank Teesside B are also outside the zone of influence. The model also represents the worst case scenario, therefore deposition levels are likely to be smaller and hence the magnitude of the effect is considered to be negligible. Aggregate extraction activities have a medium sensitivity considering the national importance of the industry. Combined with the negligible magnitude the impact is anticipated to be **negligible** for Dogger Bank Teesside B and **negligible** for Dogger Bank Teesside A (which is of greater distance from the Aggregate Application areas).

6.6.9. Although there are no dredger transit routes which cross either Dogger Bank Teesside A or Dogger Bank Teesside B there are several crossing the Dogger Bank Teesside A & B Export Cable Corridor (see Section 4 and **Figure 4.7**). These are considered under the assessment on shipping and navigation and are dealt with in **Chapter 16**.

Dogger Bank Teesside A & B together or sequentially

6.6.10. The impacts identified in relation to aggregate extraction are not considered to be significantly different if both projects are built together or in sequence. Therefore the residual impact is anticipated to remain as **negligible** for both Dogger Bank Teesside A & B.

6.7. Subsea telecommunication cables and pipelines

6.7.1. The main effects of construction on subsea cables and pipelines include the damage to:

- Active cables and pipelines as a result of disturbance to the seabed;
- Active cables and pipelines at cable crossing points (export cables and inter-array cables); and
- Out of service cables as a result of disturbance to the seabed.

Dogger Bank Teesside A or B in isolation

6.7.2. Damage to both active and inactive cables could arise during construction activities such as foundation installation and seabed preparation; export and inter-array cable installation and burial; cable and pipeline crossing construction and vessel anchoring and jacking-up.

6.7.3. Dogger Bank Teesside A & B are not crossed by any cables or pipelines. However the Dogger Bank Teesside A & B Export Cable Corridor will cross two active subsea pipelines (the SEAL and the Langeled pipelines) (see **Figure 4.8**). Within the area of the Dogger Bank Teesside A & B Export Cable landfall several planned, active or out of use cables and pipelines are located as described in **Table 4.3** and shown in **Figure 4.9.** Those closest to the cable landfall include the out of service Pangea North UK/DMK and the active CANTAT 3 F4 telecommunication cables. The proposed Breagh pipeline is planned to cross both these cables offshore and will be located 5.6km from the Dogger Bank Teesside A & B Export Cable landfall.

6.7.4. Subsea cables and pipelines are considered to be of international importance. Damage could have large financial and social implications and cause long lasting disruption to services or supply. The sensitivity of subsea cables and pipelines is considered to be high, and it is recognised that effects of a high magnitude could occur in the event of an incident.

6.7.5. In order to reduce the potential impact and magnitude of such an incident a number of actions and mitigations measures are available and include the following:

- On-going consultation with cable operators BT, Cable and Wireless, TATA communications and pipeline operators Gassco, Shell and RWE Dea is taking place with regard to the potential interaction of the Dogger Bank Teesside A & B Export Cable Corridor and the existing infrastructure of each company. This early consultation with operators will have an influence on the design process and will work towards developing concordance on crossings and proximity agreements where these are deemed necessary. As a result of discussions with Forewind, RWE Dea have supported Forewind's proposal to increase the works areas around the Breagh pipeline by 750m thereby turning the area around the location of the crossing into a permanent works area;
- A minimum separation distance between underwater structures, wind turbines and telecommunication cables and pipelines is under negotiation through consultation with the operators. Final separations distances are yet to be confirmed and this will be on a case by case basis with individual operators;

- A comprehensive map of all cables and pipelines will be provided to the project(s) construction team, and Notice to Mariners will be issued as required; and
- In the process of developing the proximity agreements other mitigation measures with respect to design may be undertaken. These could include number, design and construction of crossing points and confirmation of final separation distances to any Dogger Bank Teesside A & B activity or infrastructure.

6.7.6. Out of service cables are expected to be partially or fully removed within the project area in consultation with the operator. The alternative would be to re-route the out of service cable where appropriate but this would only take place after discussions with the operator and statutory bodies i.e. the Marine Management Organisation (MMO) and The Crown Estate.

6.7.7. There is a possibility of re-routeing active telecommunications cables, but this would only be undertaken after agreement with the operators. As an example of this type of agreement and after discussions with Forewind and BT, RWE Dea have had the BT Cantat cable removed in the nearshore area;

6.7.8. If the measures outlined above were implemented and formal agreements drawn up with the affected parties, it is considered that the magnitude of the effect would be reduced to low and the residual impact is anticipated to be **minor adverse**.

Dogger Bank Teesside A & B together or sequentially

6.7.9. The impacts identified in relation to subsea cables and pipelines are not considered to be significantly different if both projects are built together or in sequence. Therefore the residual impact is anticipated to remain **minor adverse**.

7. Assessment of Impacts during Operation

7.1. Other renewable energy projects

7.1.1. Other renewable energy projects could be affected during operation by:

- General disruption in the event that operations overlap;
- Increased pressure on ports;
- Safety of navigation; and
- Overlap in aviation (helicopter) routes.

7.1.2. There is also the potential to share safety infrastructure between projects which is considered to be a beneficial impact if implemented.

7.1.3. Navigational issues are addressed in **Chapter 16**, including any effects relating to an increase in vessel movements during operation.

7.1.4. Aviation matters are considered in **Chapter 19.**

Dogger Bank Teesside A or B in isolation

7.1.5. The main activities during the operations phase will include vessel movements for maintenance and repair and personnel moving from port to wind farm and between ancillary structures. The impacts on vessel and helicopter movements are assessed in **Chapter 16** and **19** respectively.

7.1.6. Although the level of activity during the operation phase will be substantially lower than during construction, with regard to activities such as vessel round trips to port, there is a possibility that other renewable projects may utilise the same port facilities. During operation and maintenance the worst case scenario for vessel movements would be 730 round trips to port if all wind turbine generators were 6MW, as opposed to 660 round trips if wind turbines were 10MW in which case there will be fewer structures. Although reduced considerably from the worst case of 5150 vessel round trips during construction there may still be some extra pressure on port facilities if Teesside or other nearby ports e.g. on the Humber are the main service locations. However Forewind have not identified the port or ports which will be used during the operational phase so it is not possible to assess the level of impact. It is anticipated that the port(s) chosen will be assessed by Forewind on the basis of the ability to provide adequate service provision. In this case adverse impacts are not anticipated.

7.1.7. The potential socio-economic benefits on service ports from Dogger Bank Teesside A & B are addressed in **Chapter 22**.

Dogger Bank Teesside A & B together or sequentially

7.1.8. This scenario would result in a potential doubling of vessel round trips per year and the worst case scenario would be 1,460 movements per year (equating to four per day) if all wind turbines were 6MW in comparison to 1,320 if 10MW

turbines were installed. Although Teesside Offshore Windfarm is in close proximity to Teesside port, Forewind has not yet chosen the port (s) which will be used for servicing Dogger Bank Teesside A & B. The choice will be made on the assessed ability of the port to provide adequate facilities and services. Therefore it is not anticipated that there will be any additional impact when both projects are either operating together or sequentially.

7.2. Carbon capture and storage

7.2.1. Since CCS projects in the area (Teesside) are still at the proposal stage and the proposed pipeline location is still in planning there is a high level of uncertainty with regards to the timing, nature and exact location of coastal and offshore infrastructure and activities.

7.2.2. National Grid Carbon is involved in two applications for DECC funding for CCS projects one of which proposes a CO_2 pipeline with a coastal location in Teesside (part of a consortium which includes Progressive Energy (see Section 4.2). NGC has indicated that there may be structures relating to CO_2 transport in the vicinity of the Dogger Bank Teesside A & B Export Cable landfall at Marske-by-the-Sea. However no firm plans have been proposed yet, therefore the level of impact during operational maintenance and repair in relation to the export cable is difficult to assess. No other potential impacts have been identified since the CCS cluster projects are land-based apart from the CO_2 pipeline and associated coastal infrastructure.

7.2.3. Forewind are in on-going consultation with NGC and Progressive Energy regarding the applications. It is anticipated that with consultation and agreement, operational activities for Dogger Bank Teesside A & B will not affect any future plans and therefore the magnitude of effect remains unchanged (negligible). Given the medium sensitivity of CCS as an industry of national importance the residual impact is considered to be **negligible.**

7.3. Oil and gas activity

Dogger Bank Teesside A or B in isolation

7.3.1. Oil and gas activities could be affected during operation by:

- Issues arising from proximity to oil and gas activity and installations;
- Scour issues;
- Safety of navigation; and
- Overlap in aviation (helicopter) routes.

7.3.2. Navigation and aviation matters are considered in **Chapter 16** and **Chapter 19**, and are not discussed further in this section. Oil and gas pipelines are covered in Section 7.5.

7.3.3. There are currently no active oil and gas infrastructure within or in close proximity to Dogger Bank Teesside A & B, or the Dogger Bank Teesside A & B Export Cable Corridor. The nearest platforms are the Tyne and Munro platforms 45km from Dogger Bank Teesside B although it is recognised that there may be future development in the area.

7.3.4. The Cygnus gas field is located 25km to the south of Dogger Bank Teesside B in licence blocks 44/11a and 44/12a (developer GDF Suez E&P UK) and there are current plans to develop satellite platforms. Licence blocks 44/4a, 44/5 and 45/4 (developer Centrica North Sea Gas Ltd (CNSGL)) are within Dogger Bank Teesside A and licence block 42/10 overlaps with the Dogger Bank Teesside A & B Export Cable Corridor and is owned by RWE Dea Ltd. Although oil and gas installations usually enforce a 500m safety zone Forewind is in on-going consultation with all operators and developers of licence blocks to ensure that there is no impact which may arise as a result of operating infrastructure, ancillary structures or inter-array cables.

7.3.5. As recommended in National Policy Statement EN-3 (DECC 2011) offshore wind farm developers are encouraged to actively engage with other marine users to enable solutions to be found for various activities to co-exist. To this end Forewind is in consultation with GDF Suez E&P UK with regards the development of the Cygnus gas field and associated infrastructure and this programme will continue throughout the life of the development.

7.3.6. Issues related to scour of the seabed has been included as part of the marine physical processes assessment (**Chapter 9**). The assessment indicates that after one year the predicted scour of the seabed is limited to the near vicinity of the wind farm foundations and maximum suspended sediment deposition of 0.1mm-0.5mm is predicted to occur in this area. The maximum deposition is predicted to reduce to 0.1mm 30km outside the project boundaries within both projects. After two years maximum deposition would be 0.5-5mm within each project reducing to less than 0.1mm up to 23km outside the project boundaries. The predicted bed thickness after the 30 day simulation was less than 0.1mm across most of the area. The study compared operational scour with naturally occurring release during a one year storm and found that scour from operational activities is predicted to be five times less than half the volume which would occur naturally. In view of this assessment it is considered that with respect to seabed scour due to operational activities **no impact** is predicted.

7.3.7. It is therefore considered that the potential for significant effects as a result of interaction of activities during operation will be minimised through on-going consultation with the relevant operators and developers. With this process on-going, as well as other measures which have been identified and put in place, the magnitude of the effect is considered to be low. As an activity of national importance the sensitivity is considered to be medium. The residual impact is therefore anticipated to be **minor adverse**.

Dogger Bank Teesside A & B together or sequentially

7.3.8. The impacts identified in relation to oil and gas activities are not considered to be significantly different if both projects are built together or in sequence. Therefore the residual impact is anticipated to remain as **minor adverse**.

7.4. Aggregate extraction activity

7.4.1. Aggregate extraction activity could be affected during operation by:

- Changes to marine physical processes causing loss or deposition of sediment due to scour occurring around the base of the foundations and across the project area;
- Risk of interaction between an aggregate dredging vessel and installed subsea cables (namely inter-array cables); and
- Increased steaming times and increased risk of vessel collision.

7.4.2. Shipping and navigation (steaming times and collision) matters are considered in **Chapter 16** and are not discussed further in this section.

Dogger Bank Teesside A or Dogger Bank Teesside B in isolation

7.4.3. As part of the marine physical processes assessment, sediment plume modelling and suspended sediment due to scour have been predicted (as described in **Chapter 9**). The model simulated operational scour volumes in comparison with the release of sediment during a one year storm. The results showed that naturally occurring suspended sediment volumes were predicted to be six times greater than the volume occurring as a result of scour occurring around a 6MW conical GBS foundation.

7.4.4. In relation to modelling the changes in deposition over a 30day simulation period, the maximum sediment deposition during operational activities is predicted to 0.1-0.5mm. The thickness of the deposited sediment is predicted to reduce to 0.1mm between 23km southwest of Dogger Bank Teesside B and 19km north of Dogger Bank Teesside A.

7.4.5. There are a lack of aggregate sites within the vicinity of Dogger Bank Teesside A or Dogger Bank Teesside B and the Dogger Bank Teesside A & B Export Cable Corridor, the closest being 466/1 28km to the north west of Dogger Bank Teesside B. The other sites 485/1 and 2 are 32km and 31km to the south of the Dogger Bank Teesside A & B Export Cable Corridor respectively. The minimal deposition levels of 0.1mm are considered to have little effect on aggregate extraction activities, thus the magnitude is considered to be negligible. Since aggregate activity is considered to be of national importance but one which may be able to tolerate some disruption, or would be expected to recover without long-term effects the sensitivity is considered to be medium. The impact is therefore anticipated to be **negligible**.

7.4.6. In relation to the potential interaction between aggregate dredging vessels and maintenance and repair vessels used for Dogger Bank Teesside A & B there are several transit routes which cross the Dogger Bank Teesside A & B Export Cable Corridor (**Figure 4.7**). The number of transit routes increases in number towards the landfall with a greater concentration in the coastal area. This interaction is considered under shipping and navigation issues in **Chapter 16** and is not considered further for this assessment.

Dogger Bank Teesside A & B together or sequentially

7.4.7. The impacts identified in relation to sediment deposition and aggregate activities are not considered to be significantly different if both projects are built together or in sequence. Therefore the residual impacts are anticipated to remain as **negligible**.

7.5. Subsea cables and pipelines

7.5.1. Subsea cables and pipelines could be affected during operation by:

- Damage to cables or pipelines arising from disturbance at the seabed;
- Changes to marine physical processes affecting stability or integrity of cables and pipelines; and
- Restriction of cable and pipeline maintenance activity.

Dogger Bank Teesside A or Dogger Bank Teesside B in isolation

7.5.2. During operation there will be annual maintenance and repair visits to Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor. Anchoring or jacking-up of any vessels involved in maintenance could cause damage to subsea cables and pipelines, with the potential for causing an effect of high magnitude (see discussion under Section 6.7).

7.5.3. However, Forewind will observe the appropriate buffers from 3rd party infrastructure during maintenance activities as well as during construction. With these buffers in place the magnitude of effect will be reduced to negligible leading to a **minor adverse** residual impact when combined with the high sensitivity of the receptor.

7.5.4. The scour assessments conducted as part of the marine physical processes assessment (**Chapter 9**) indicate that cables and pipelines will not be affected by stability or integrity issues as a result of scour processes. Scour is not expected beyond the immediate vicinity of seabed foundations and there are no subsea cables or pipelines which cross either Dogger Bank Teesside A or B. Therefore**, no impact** is anticipated from scour processes.

7.5.5. There is the potential for the physical presence of associated infrastructure to restrict cable and pipeline maintenance activity. Forewind has however included a 750m minimum proximity buffer in the design of the development, between surface infrastructure and any cable or pipeline (500m between active telecommunication cables and inter-array cables, other than at crossing points). Final separation distance/s and the design of crossing points will be agreed and confirmed on a case by case basis with each cable or pipeline operator.

7.5.6. On account of this the magnitude of effect is considered to be negligible and combined with the high sensitivity of the receptor, the impact is anticipated to be **minor adverse**.

Dogger Bank Teesside A & B together or sequentially

7.5.8. Considering the points outlined above, it is not anticipated that there will be any additional impact to cables and pipelines when both projects are operating together, therefore the impacts described above also apply should both Dogger Bank Teesside A & B operate together or sequentially.

8. Assessment of Impacts during Decommissioning

8.1.1. During the decommissioning phase of the project the worst case scenario is for all components of the project to be removed, including turbines, foundations, scour protection and cables (see **Chapter 5** for further details). Exact decommissioning arrangements will be detailed in a Decommissioning Plan, which will be drawn up and agreed with DECC prior to construction. Any impacts arising from the decommissioning process will be the subject of future assessment, once the nature of activities is understood. However, no impacts greater than those assessed during the construction phase are anticipated.

8.1.2. Once decommissioned, the development is not expected to have any on-going impacts on other marine users.

9. Inter-Relationships

9.1.1. In order to address the environmental impact of the proposed development as a whole, this section identifies the inter-relationships between other marine users and other physical, environmental and human receptors. The objective is to identify where the accumulation of residual impacts on a single receptor, and the relationship between those impacts, gives rise to a need for additional mitigation.

9.1.2. **Table 9.1** summarises the inter-relationships that are considered of relevance to other marine users and identifies where they have been considered within the ES. No inter-relationships have been identified where an accumulation of residual impacts on other marine users and the relationship between those impacts gives rise to a need for additional mitigation.

9.1.3. A summary of all of the identified inter-relationships for the Dogger Bank Teesside A & B EIA is provided in **Chapter 31 Inter-relationships**.

Table 9.1 Inter-relationships relevant to the assessment of other marine users

Inter-relationship	ES section where addressed	Linked chapter
All phases		
Impacts on aggregate activity due to sediment deposition.	Sections 6.6 and 7.4	**Chapter 9 Marine Physical Processes**
Impacts on the shipping and navigation activities of other marine users, particularly other offshore wind farms and aggregate activity.	Sections 6.2, 6.6, 7.1 and 7.4	**Chapter 16 Shipping and Navigation**
Impacts on the aviation activities of other marine users, particularly other offshore wind farms and the oil and gas industry.	Section 6.2, 6.5, 7.1 and 7.3	**Chapter 19 Civil Aviation and Military Activities**

10. Cumulative Impacts

10.1.1. This section describes the cumulative impact assessment (CIA) for other marine users, taking into consideration other plans, projects and activities. A summary of the CIA is presented in **Chapter 33**.

10.1.2. Forewind has developed a strategy for the assessment of cumulative impacts in consultation with statutory stakeholders including the MMO, the Joint Nature Conservation Committee (JNCC), Natural England (NE) and the Centre for Environment, Fisheries and Aquaculture Science (Cefas). Details of the approach to cumulative impact assessment adopted for this Environmental Statement are provided in **Chapter 4** and **Chapter 33.**

10.1.3. 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.

10.1.4. 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 seeks to establish the 'confidence' we can have in the data and information available.

10.1.5. There are two key steps to the Forewind CIA strategy, which both involve 'screening' in order to arrive, ultimately, at an informed, defensible and reasonable list of other plans, projects and activities to take forward in the assessment.

10.1.6. The first step in the CIA for other marine users involved an appraisal of the key impacts relevant to each of the receptors that have been identified (**Table 10.1**). 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.

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

10.1.8. For other marine users, the potential for cumulative impacts is identified in relation to offshore wind farm projects, CCS, oil & gas activities, aggregates, and subsea cables and pipelines (**Table 10.1**). However, it has been determined that cumulative impacts on these receptors are not expected to manifest

outside, or beyond 1km of the Dogger Bank Zone and Dogger Bank Teesside A & B Export Cable Corridor. In all cases, data confidence is assessed as medium to high. On this basis, the potential for any other cumulative impacts is screened out from further consideration in the process.

Table 10.1 Potential cumulative impacts (impact screening)

Impact	Dogger Bank Zone and Dogger Bank Teesside A & B Export Cable Corridor		Beyond 1km from the Dogger Bank Zone and Dogger Bank Teesside A & B Export Cable Corridor		Rationale for where no cumulative impact is expected
	Potential for cumulative impact	Data confidence	Potential for cumulative impact	Data confidence	
Impacts on other offshore wind farm projects	Yes	High	No	High	No cumulative impact anticipated outside the Dogger Bank Zone to lack of spatial and temporal overlap (see Section 6) although Teesside Offshore Windfarm (now close to fully operational) is situated close to the Dogger Bank Teesside A & B Export Cable landfall.
Impacts on CCS	Yes	Medium	No	N/A	As above
Impacts on oil and gas	Yes	Medium	No	N/A	As above
Impacts on aggregates	Yes	High	No	N/A	As above
Impacts on subsea cables and pipelines	Yes	High	No	N/A	As above. Note: existing infrastructure is not included in the CIA

10.1.9. Where the first step has indicated the potential for cumulative impacts, the second step in the CIA for other marine users 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 an exhaustive list of plans, projects and activities occurring within a very large study area encompassing the greater North Sea and beyond (referred to as the 'CIA Project list', see **Chapter 4**). 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.

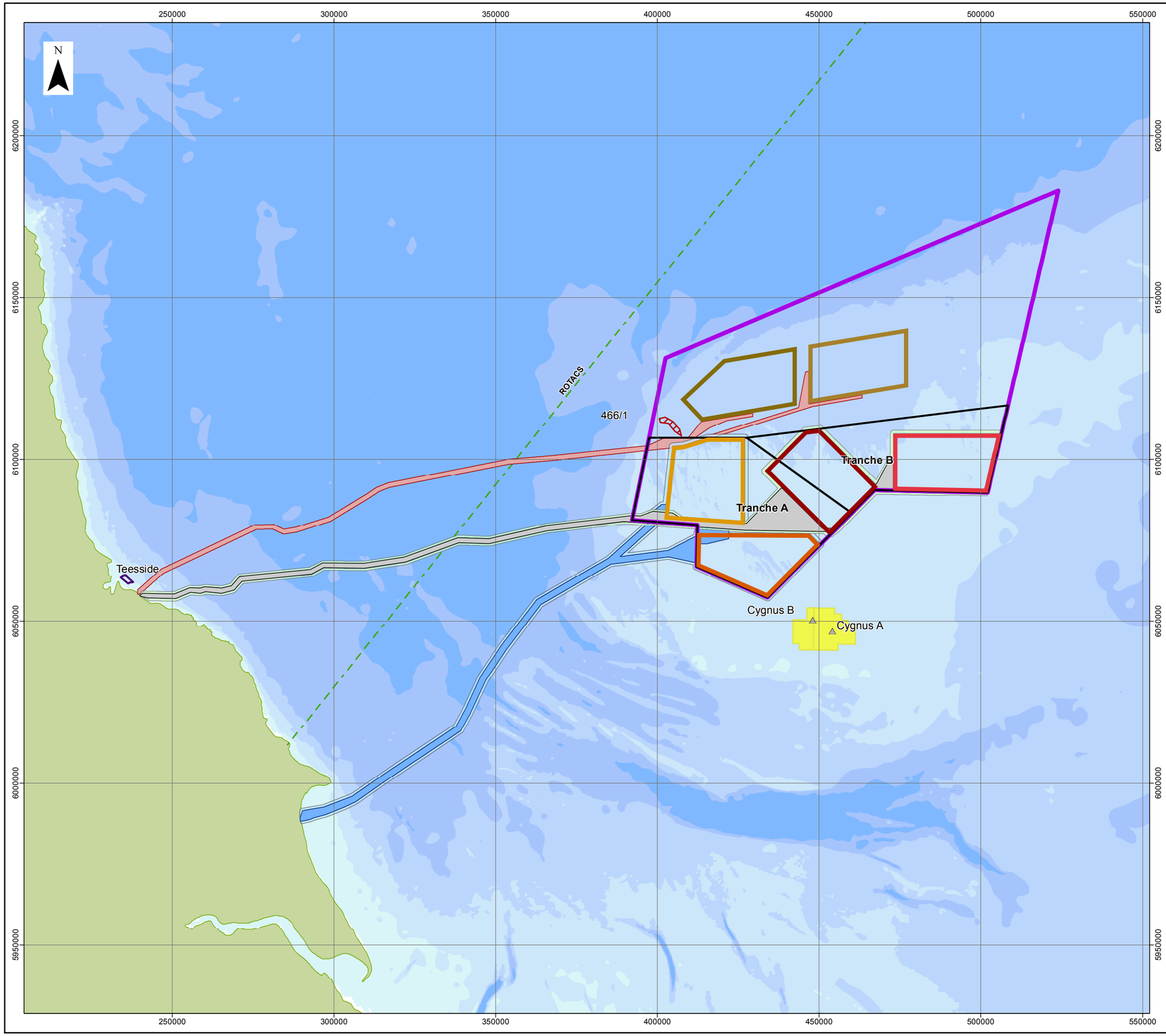
10.1.10. The plans, projects and activities relevant to other marine users are presented in **Table 10.2** and **Figure 10.1** along with the results of the screening exercise which identifies whether there is sufficient confidence to take these forward in a detailed CIA.

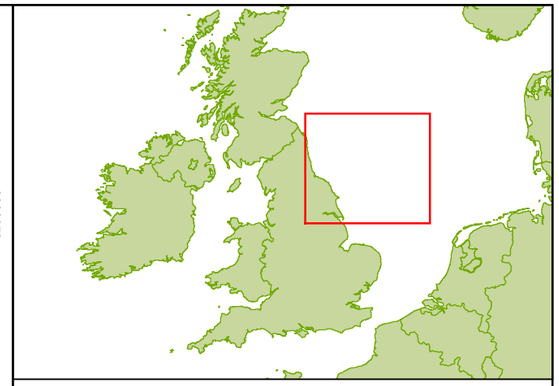
10.1.11. It should be noted that:

- 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 already having an impact and so are part of the existing environment as it has been assessed throughout this ES. Therefore these projects have not been included in the CIA with the exception of Cleveland Potash Ltd. This activity has been included in the impact assessment because of the concerns raised during consultation.

Table 10.2 Cumulative impact assessment screening for other marine users (project screening)

Type of Project	Project title	Project status	Predicted construction/development period	Distance from Dogger Bank Teesside A & B nearest boundary	Confidence in project data	Carried forward to CIA	Rationale for not carrying forward to CIA
Offshore wind farm	Teesside Offshore wind farm	Close to fully operational	Project expected to be completed early in the second quarter of 2013.	199	High	Yes	N/A
Offshore wind farm	Dogger Bank Creyke Beck	Application	Construction may start 2016	4	High	Yes	N/A
Offshore wind farm	Dogger bank Teesside C & D	Planning	Not confirmed	TBC	Low	Yes	N/A
Carbon Capture and Storage	Teesside CCS project	Planning	Not confirmed	5.9	Low	No	Low confidence in project details and data
Oil and gas	Cygnus gas field	Development (pre-production)	Potential production by 2015	24.3	Medium	Yes	N/A
Aggregate extraction	Area 466/1	Application area	In consultation	28	Medium	No	Distance to Dogger Bank Teesside B
Aggregate extraction	Area/485/1	Application area	Not confirmed	63	Medium	No	Distance to Dogger Bank Teesside A & B
Aggregate extraction	Area 485/2	Application area	Not confirmed	59	Medium	No	Distance to Dogger Bank Teesside A & B





LEGEND

- Dogger Bank Zone
- Tranche boundary
- Dogger Bank Creyke Beck A
- Dogger Bank Creyke Beck B
- Dogger Bank Teesside A
- Dogger Bank Teesside B
- Dogger Bank Teesside C
- Dogger Bank Teesside D
- Dogger Bank Teesside A & B Export Cable Corridor
- Dogger Bank Teesside A & B temporary works area
- Dogger Bank Creyke Beck Export Cable Corridor
- Dogger Bank Creyke Beck temporary works area
- Dogger Bank Teesside C & D Export Cable Corridor
- Cygnus gas field development
- Cygnus proposed subsurface infrastructure
- Teesside offshore wind farm
- Aggregate application area
- Proposed subsea cable

0 10 20 40
Kilometres

Data Source:
Oil & Gas © DECC, 2014
Energy Projects and Aggregate Areas © The Crown Estate, 2013
Background bathymetry image derived in part from TCarta data © 2009

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 10.1 Other plans, projects and activities for Cumulative Impact Assessment

VER	DATE	REMARKS	Drawn	Checked
1	16/08/2013	Draft	FK	PT
2	03/10/2013	PEI3	JE	PT
3	06/02/2014	Pre-DCO Submission	LW	TR

DRAWING NUMBER:

F-OFL-MA-583

SCALE	1:1,200,000	PLOT SIZE	A3	DATUM	WGS84	PROJECTION	UTM31N

FOREWIND

10.1.12. The potential cumulative impacts which could result from impacts identified during the construction, operation and decommissioning of Dogger Bank Teesside A & B (see Sections 6 to 8) are discussed in the following sections.

10.2. Cumulative impacts on other offshore wind farms

10.2.1. The assessment of Dogger Bank Teesside A or Dogger Bank Teesside B in isolation or in sequence does not anticipate an impact on other renewable projects. There is no spatial overlap with other projects although there is a potential for construction periods to overlap. The closest wind farm project to Dogger Bank Teesside A & B will be Dogger Bank Creyke Beck which is also being developed by Forewind. The closest major offshore wind farm development operated by other developers include the Round 3 Hornsea Zone (Optimus project), which is located 112km from the southern boundary of Dogger Bank Teesside A and 95km from Dogger Bank Teesside B (**Figure 4.1**) and Teesside Offshore Windfarm 198km to the west which is now operational. This distance means the potential for Dogger Bank Teesside A & B to cause cumulative impacts on these wind farms with other plans, projects and activities, is limited. The distance between the Dogger Bank Teesside A & B Export Cable landfall and Teesside Offshore Windfarm cable landfall is 6.1km and is considered to be of sufficient distance apart for little of no interaction to occur, either as a result of construction activities for Dogger Bank Teesside A & B or operational activities for the Teesside Offshore Windfarm.

10.3. Cumulative impacts on carbon capture and storage

10.3.1. It is anticipated that during construction there is a potential for a minor adverse impact of construction activities on the CCS pipeline in planning for the Low Carbon Teesside project due to the close proximity of the Dogger Bank Teesside A & B Export Cable landfall and the CO_2 pipeline. This is the impact anticipated for Dogger Bank Teesside A or Dogger Bank Teesside B in isolation, or together (Section 6.3). The potential for Dogger Bank Teesside A & B to cause cumulative impacts through interaction with Dogger Bank Creyke Beck is limited due to the separation distance of the export cable landfall sites. In conjunction with other plans, projects and activities there is a potential for operational activities of Teesside Offshore Windfarm, and construction activities for the Dogger Bank Teesside A & B Export Cable landfall to interact with the coastal site for the CO_2 pipeline. However since there is a lack of detail concerning the exact timing, location and nature of the Teesside CCS projects at this time an accurate assessment on cumulative impacts cannot be made.

10.4. Cumulative impacts on oil and gas activity

10.4.1. The impact assessment considered that there would be a minor residual adverse impact of Dogger Bank Teesside A & B on oil and gas activities through general disruption and proximity developments. The same level of impact is anticipated for Dogger Bank Teesside A or Dogger Bank Teesside B in isolation or together. There is currently no active oil and gas infrastructure within the Dogger Bank Teesside A or Dogger Bank Teesside B projects, however concern was raised with respect to overlapping activities in the event of

development plan slippage especially in relation seismic surveys and piling noise from other plans and projects. Oil and gas pipelines are considered in Section 10.5.

10.4.2. However Forewind is in on-going consultation with the oil and gas industry to resolve any such issues with regard to co-existence of the two activities. The effect of proper consultation and advance notification of activities involving high noise levels would be to reduce any cumulative impact. The cumulative impact is therefore assessed as being no greater than that anticipated for Dogger Bank Teesside A or Dogger Bank Teesside B in isolation or together, and is therefore considered to be **minor adverse**.

10.5. Cumulative impact on cables and pipelines

10.5.1. Although there are no cables or pipelines crossing either Dogger Bank Teesside A or Dogger Bank Teesside B, the Dogger Bank Teesside A & B Export Cable Corridor will cross two active pipelines. Within the cable landfall are several either proposed, active or inactive cables and pipelines. Damage or restriction to maintenance activities for cables and pipelines will have potentially significant financial implications. The impacts assessment for Dogger Bank Teesside A or Dogger Bank Teesside B in isolation and together anticipated the residual impact to be **minor adverse**. This is as a result of a range of possible mitigation measures proposed. An assessment of cumulative impacts in relation to other plans and projects will be restricted therefore to the Dogger Bank Teesside A & B Export Cable Corridor and landfall area. Dogger Bank Creyke Beck Export Cable landfall is considered to be of too great a distance to add to the cumulative impact on cables and pipeline in the area. Other plans which could interact with the cable landfall for Dogger Bank Teesside A & B include the cable route proposed for Dogger Bank Teesside C & D and the cable landfall for Teesside Offshore Windfarm. However the range of mitigation measures proposed in Section 6.7 will be utilised for other potential projects in the zone and this includes on-going consultation with other developers. The cumulative impact is therefore considered to be **minor adverse**.

11. Transboundary Effects

11.1.1. This chapter has considered the potential for transboundary effects (effects across international boundaries) to occur on other marine users as a result of the construction, operation and decommissioning of Dogger Bank Teesside A & B.

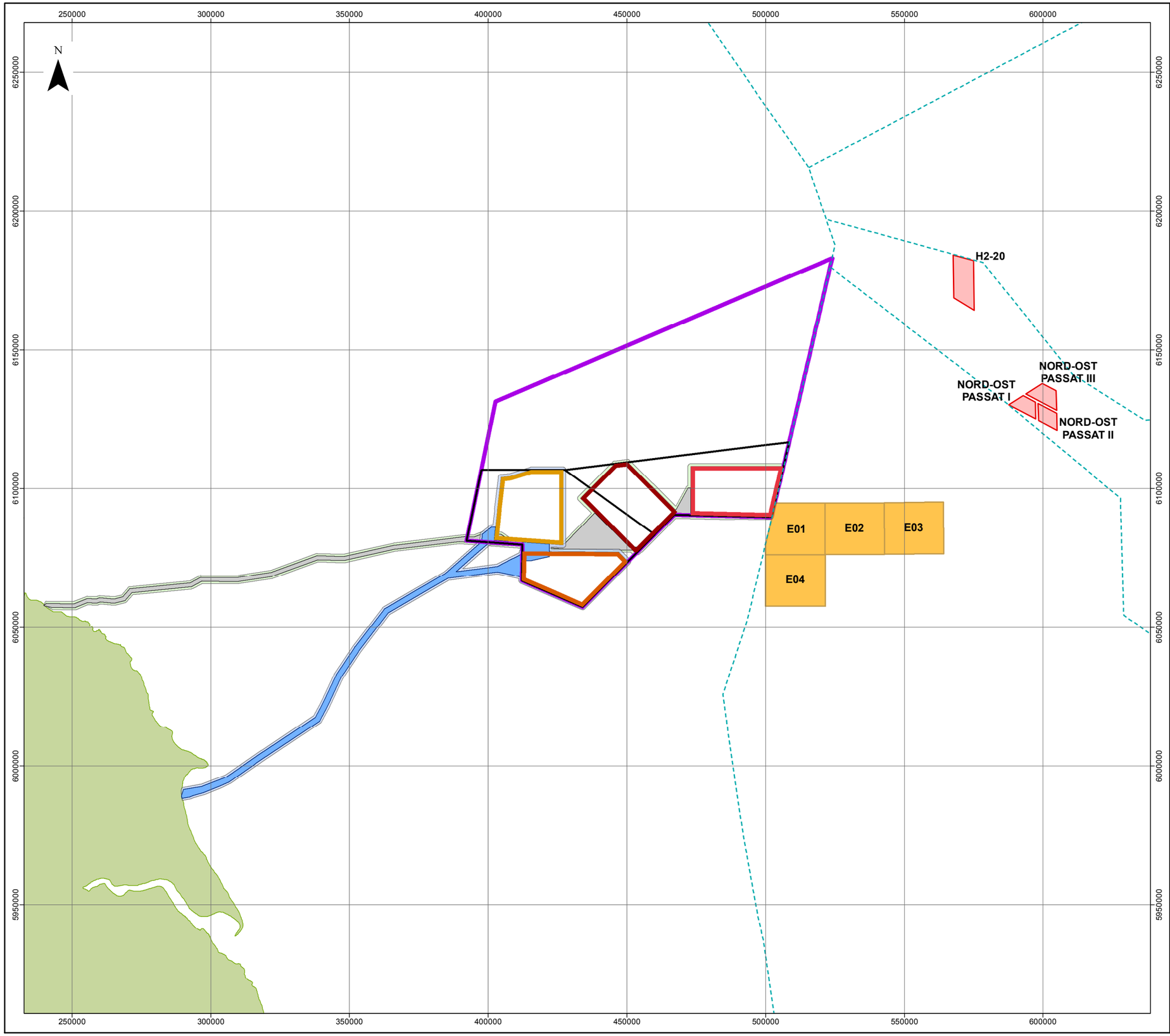
11.1.2. A summary of the likely transboundary effects of Dogger Bank Teesside A & B is presented in **Chapter 32 Transboundary Effects** and the assessment of transboundary effects has been informed through the impacts assessment in this chapter (Sections 6-8). These have been identified in relation to:

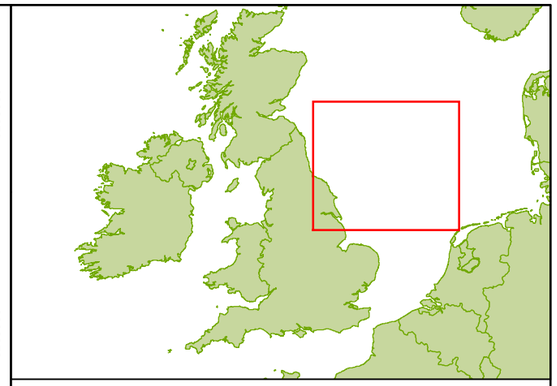
- Offshore wind farms (**negligible**);
- Carbon capture and storage (**minor adverse**);
- Oil and gas activity (**minor adverse**);
- Aggregate extraction (**negligible**); and
- Subsea telecommunication cables and pipelines (**minor adverse**).

11.1.3. Other offshore wind farms which have been considered in this section include H2-20 and Nord-Ost Passat I, II and III, all of which are in the German section of the North Sea (**Figure 11.1**). H2-20 is approximately 90km east north east of Dogger Bank Teesside A. The Nord-Ost Passat I, II and III are still in the development phase. It is considered that because of the distance of these developments from Teesside A & B there would be no impact as a result of construction, operation and decommissioning.

11.1.4. Dogger Bank Teesside A lies adjacent to the boundary with another European Economic Area (EEA) state (the Netherlands) and adjacent to Dutch exploration block E01and in close proximity to exploration blocks E02, E03 and E04. It is not anticipated that the potential impacts identified above will occur over a large enough area to affect receptors within the Netherlands or German boundary, with the possible exception of piling noise interacting with seismic surveys within these blocks. Forewind are involved in on-going consultation with the developers of these exploration blocks to ensure there will be minimal interaction between piling noise and seismic survey activity.

11.1.5. Although no subsea cables or pipelines cross the project area, the Dogger Bank Teesside A & B Export Cable Corridor is crossed by both cables and pipelines. Some of these are owned by, originate in, or terminate, in another EEA state. Since these are considered to be of international importance and of high sensitivity the financial implications of damage could be large for another EEA state. Forewind is in on-going consultation with potentially affected EEA states to develop a series of mitigation measures such as crossings and proximity agreements. This will reduce the magnitude of the effect to negligible. The resulting residual impact is anticipated to be **minor adverse**.





LEGEND

- Dogger Bank Zone
- Tranche boundary
- Dogger Bank Creyke Beck A
- Dogger Bank Creyke Beck B
- Dogger Bank Teesside A
- Dogger Bank Teesside B
- Dogger Bank Teesside A & B Export Cable Corridor
- Dogger Bank Teesside A & B temporary works area
- Dogger Bank Creyke Beck Export Cable Corridor
- Dogger Bank Creyke Beck temporary works area
- German wind farm
- Dutch exploration licence
- International boundary

0 10 20 40

Kilometres

Data Source:
German wind farms © Marine Find, 2013
Dutch exploration blocks © NLOG, 2014

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 11.1 Other marine activities in EEA states nearest to Dogger Bank Teesside A & B

VER	DATE	REMARKS	Drawn	Checked
1	15/08/2013	Draft	FK	PT
2	04/10/2013	PEI3	JE	PT
3	06/02/2014	DCO Submission	LW	RT

DRAWING NUMBER:

F-OFL-MA-572

SCALE	PLOT SIZE	DATUM	PROJECTION
1:1,400,000	A3	WGS84	UTM31N

FOREWIND

12. Summary

12.1. Baseline other marine users

12.1.1. This chapter of the ES has provided a characterisation of the existing environment with respect to other marine users, based on both existing and site specific survey data. The offshore areas are subject to a variety of other uses that may be affected by the development, as well as being occupied by existing infrastructure. These include: other renewable energy projects; carbon capture and storage; oil and gas activity; underground coal gasification; aggregate extraction; undersea mining and subsea cables and pipelines.

12.1.2. This assessment has established that there will be no significant impacts on any of the identified other marine users during construction, operation and decommissioning phases of Dogger Bank Teesside A & B.

12.1.3. The project area is not crossed by any telecommunications cables or pipelines. However the Dogger Bank Teesside A & B Export Cable Corridor will cross two active subsea pipelines. In the area of the Dogger Bank Teesside A & B Export Cable landfall several planned, active or out of use cables and pipelines are, or will be, located. Mitigation measures include, on-going consultation with operators, minimum separation distances between underwater structures to allow for maintenance and operation activities, comprehensive maps of all structures and the development of crossings and proximity agreements. For these reason, significant residual impacts are not anticipated. Overall the project is not anticipated to significantly affect any other marine activity assessed.

12.1.4. Consideration of the proposed effects on other marine users has been made for the construction, operation and decommissioning phases of the development with **Table 12.1** providing a summary of the potential impacts arising from the realistic worst case scenarios set out in **Table 5.1** earlier in the chapter.

Table 12.1 Summary of predicted impacts of Dogger Bank Teesside A & B on other marine users

Impact	Mitigation	Residual Impact
Construction		
Other renewable projects		
General disruption due to overlapping activities	None required	**Negligible**
Pressure on port services	None required	**No impact**
Navigational safety	Addressed in **Chapter 16 Shipping and Navigation**	
Overlap in aviation activity	Addressed in **Chapter 19 Military Activities and Civil Aviation**	
Carbon Capture and Storage		
Disruption due to overlap of construction activities	Forewind in discussions with the operator to resolves any issues e.g. separation distances between CO_2 pipeline and HVDC export cables	**Minor adverse**
Mining		
Potash mining	None required	**Minor adverse**
Oil and gas activity		
General disruption	Consultation and advance notification of activities creating high noise levels i.e. piling	**Minor adverse**
Safety of Navigation	Addressed in **Chapter 16 Shipping and Navigation**	
Overlap in aviation activity	Addressed in **Chapter 19 Military Activities and Civil Aviation**	
Aggregate extraction activity		
Deposition of suspended sediments	None required	**Negligible**
Increased steaming times and vessel collision risk	Addressed in **Chapter 16 Shipping and Navigation**	
Subsea cables and pipelines		
Potential damage to cables and pipelines from seabed disturbance and cable crossing points	Early engagement to resolve crossings and proximity agreements. Agreements on separation distances. Communication of cable and pipeline locations.	**Minor adverse**

Impact	Mitigation	Residual Impact
Operation		
Other renewable projects		
General disruption due to overlapping activities	None required	**No impact**
Pressure on port services	None required	**No impact**
Carbon capture and storage		
Overlap in structures at landfall	Discussions with the operator on location of structures to avoid overlap	**Negligible**
Oil and Gas activity		
Issues arising from proximity	Implementation of appropriate buffer zones and liaison with the potentially affected parties	**Minor adverse**
Aggregate extraction activity		
Deposition of suspended sediments	Monitoring of sediment deposition levels	**Negligible**
Interaction of inter-array cables and dredging vessels	Forewind will engage with the operator and take account of latest available guidance	**Chapter 16**
Subsea cables and pipelines		
Potential damage due to operation and maintenance activity	Early engagement to resolve crossings and proximity agreements. Agreements on separation distances. Communication of cable and pipeline locations.	**Minor adverse**
Scour processes affecting integrity of cables and pipelines	None required	**No impact**
Potential restriction of cable and pipeline maintenance activities	Forewind has established buffer zones to any cable and pipeline and final separation distances will be agreed with the operator on a case by case basis	**Minor adverse**
Decommissioning		
Impacts subject to future assessment. No impacts greater than those during construction are anticipated.		

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