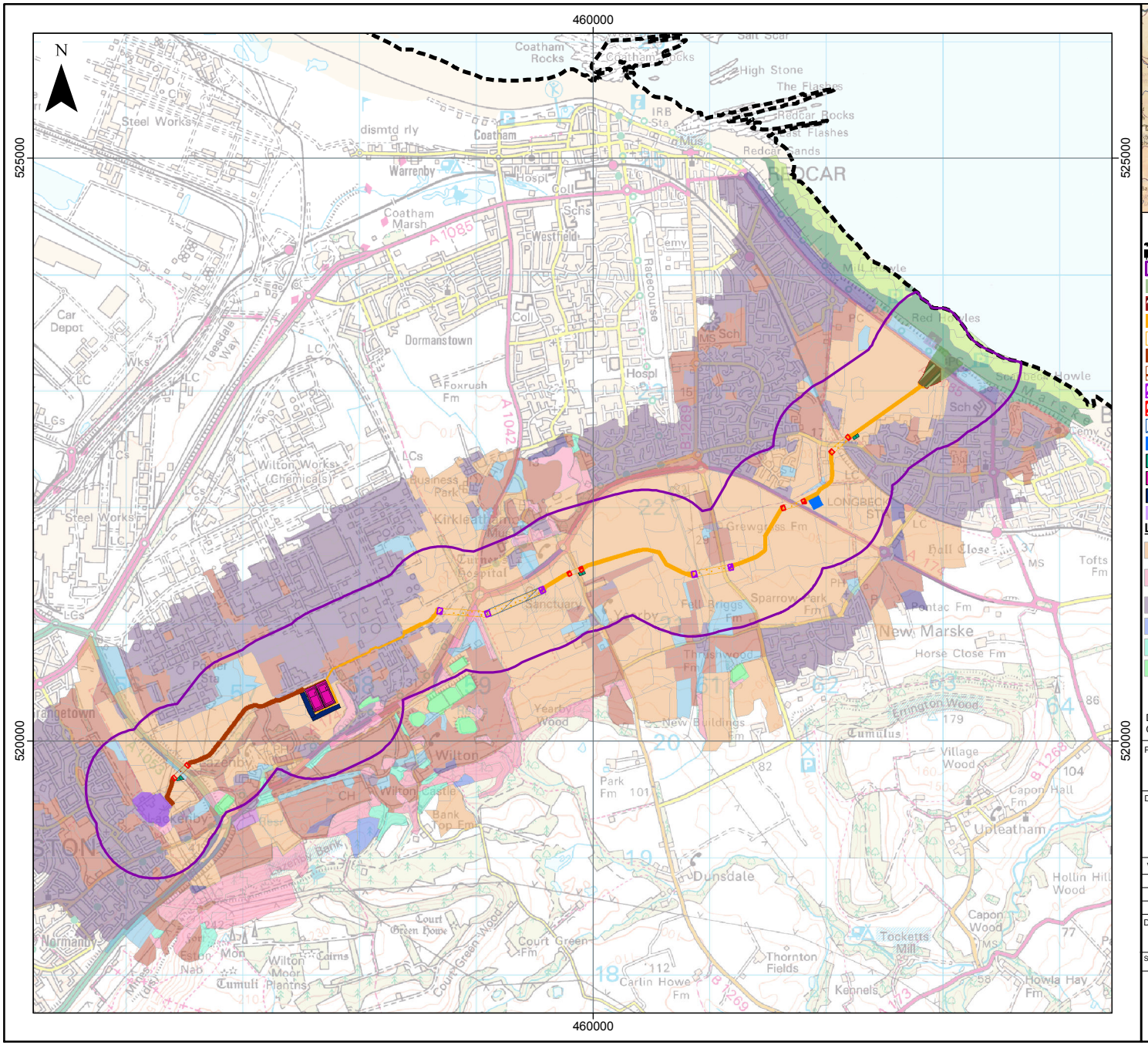


LEGEND

- Indirect Impacts Study Area - Redcar and Cleveland
- Direct Impacts Study Area - 500m
- Teesside A&B cable landfall
- Teesside A&B landfall construction
- Teesside A&B HVDC, Open
- Teesside A&B HVDC, HDD
- Teesside A&B HVAC, Open
- Teesside A&B HVAC, HDD
- Teesside A&B major horizontal directional drill entry or exit locations
- Teesside A&B minor horizontal directional drill entry or exit locations
- HDD or open trench to be confirmed
- Teesside A&B cable route primary construction compound
- Teesside A&B intermediate construction compound
- Teesside A&B converter stations
- Teesside A&B converter stations construction compounds (10,000m² per
- Lackenby 400kV substation

Land Cover Mapping (2007)

- Arable and horticulture
- Broad leaved/mixed/yew woodland
- Built up areas and gardens
- Coniferous woodland
- Dwarf shrub heath
- Freshwater
- Improved grassland
- Inland rock
- Littoral sediment
- Neutral grassland
- Rough low-productivity grassland
- Salt water
- Supra-littoral sediment

0 2
Kilometres

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

PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.6: Land Cover Mapping

VER	DATE	REMARKS	Drawn	Checked
3	02/07/2013	Draft	SW	JB
4	30/08/2013	Submit for PEI3	SW	JB
5	27/01/2014	Pre-DCO submission review	SW	JB

DRAWING NUMBER: **F-ONL-MA-402**

SCALE	1:50,000	PLOT SIZE	A4	DATUM	OSGB36	PROJECTION	BNG

FOREWIND

Regional baseline

4.6.4 **Table 4.4** shows the farm types found in South Teesside, the North East and England as a whole. The agricultural land use of South Teesside is dominated by cereal crops (29%) and mixed farms (28%). Dairy and livestock combined make up 33% of the agricultural land use. This is similar to the proportions seen in England as a whole; however, there are a noticeably smaller number of livestock farms than the North East in general.

Table 4.4 Farm types within South Teesside, the North East and England

Farm Type	South Teesside		North East		England	
	Area (ha)	% Farmed Area	Area (ha)	% Farmed Area	Area (ha)	% Farmed Area
Cereals	3,519	29	115,215	20	2,618,661	29
General Cropping[1]	618	5	22,630	4	1,422,119	16
Horticulture	0	0	2,320	0	154,058	2
Specialist Pigs	647	5	2,017	0	61,616	1
Specialist Poultry	0	0	1,332	0	77,939	1
Dairy	1,469	12	12,759	2	941,384	11
Grazing Livestock (LFA[2])	1,355	11	262,311	46	1,182,134	13
Grazing Livestock (Lowland)	1,178	10	55,004	10	1,435,135	16
Mixed	3,509	28	96,432	17	988,032	11
Other	0	0	400	0	6,213	0
TOTAL FARMED	**12,321**	**100**	**570,420**	**100**	**8,887,289**	**100**

Source: Derived from Defra (2011)

[1] General Cropping refers to all crops other than cereals

[2] LFA = Less Favoured Area

4.6.5 The number of people that are directly employed in agriculture in South Teesside is 371 (Defra 2011). As shown in **Table 4.5** the average % of farmed area is similar to England as a whole so there are no specific concerns regarding the marginal nature of farm operations. Marginal farms are those where it is considered that even a small reduction in the area of land available for agriculture may render the farm economically unviable in its current form.

Table 4.5 Farm sizes within South Teesside, the North East and England

ALC Grade	South Teesside		North East		England	
	Area (ha)	% Farmed Area	Area (ha)	% Farmed Area	Area (ha)	% Farmed Area
Less than 5ha	13	8	283	7	9,181	9
Between 5ha and 20ha	39	25	861	21	28,693	27
Between 20ha and 50ha	31	20	665	16	22,244	21

ALC Grade	South Teesside		North East		England	
	Area (ha)	% Farmed Area	Area (ha)	% Farmed Area	Area (ha)	% Farmed Area
Between 50ha and 100ha	29	19	753	18	19,072	18
Greater than 100ha	44	28	1,620	39	26,259	25
TOTAL	**156**	**100**	**4,182**	**100**	**105,449**	**100**

Source: Derived from Defra (2011)

Direct Impacts Study Area

4.6.6 The cropping and agricultural practices found within the Direct Impacts Study Area appear to be similar to the Redcar and Cleveland area as a whole. **Table 4.6** shows the main land cover found within the Direct Impacts Study Area according to the land cover mapping (CEH 2007).

Table 4.6 Approximate areas of cropping and agricultural practices within the Direct Impacts Study Area from land cover mapping

Land Cover	Area (ha, rounded)	Area (%, rounded)
Arable and horticulture	553	55
Broad leaved, mixed and yew woodland	18	2
Built up areas and gardens	213	21
Dwarf shrub heath	2	0
Freshwater	4	0
Improved grassland	141	14
Littoral sediment	20	2
Neutral grassland	46	5
Rough low-productivity grassland	4	0
Sea water	12	1
TOTAL	**1,012**	**100**

Source: Derived from CEH (2007)

4.6.7 **Figure 4.6** shows the land cover found according to the land cover mapping (CEH 2007).

4.6.8 In addition, initial feedback from landowners and occupiers on cropping and rotation has also been reviewed (see **Figure 4.1**). This feedback supports the general picture provided by the existing sources discussed above.

4.6.9 The agricultural land within the study area is mainly arable with a mixture of cereals and oilseed rape. There are also areas of grass paddocks. It should be noted that at the time of the site visit (January 2013) a number of fields were fallow presumably in preparation for spring cereals.

4.6.10 Section 4.4 describes the soil conditions present within the study area. This included the identification of soils with impeded or semi-impeded drainage. It is therefore likely that artificial field drainage systems may have been installed to facilitate the agricultural uses described above. This could include field drains, ditches and dykes. Drains are typically at a depth of between 0.5m and 1.5m, and may be made of ceramic, plastic, compacted soils or other appropriate materials.

4.6.11 The specific conditions found on a field by field basis have not been identified as part of this assessment.

4.6.12 No invasive weeds have been identified within the Study Area as part of the ecological Extended Phase 1 Habitat Survey (Peak Ecology 2013).

4.7 Environmental Stewardship Schemes

4.7.1 Environmental Stewardship Schemes provide funding and advice to farmers, tenants and other land managers to encourage effective environmental management of land (Natural England 2012). They are a key tool for the delivery of the Rural Development Programme for England 2007-2013, funded by the European Union and UK Government. The schemes are administered by Natural England for Department of Food and Rural Affairs (Defra). The key objectives of such schemes, which is achieved through targeted funding and advice are to (Natural England 2012):

- Look after wildlife, species and their many habitats;
- Ensure land is well managed and retains its traditional character;
- Protect historic features and natural resources;
- Ensure traditional livestock and crops are conserved; and
- Provide opportunities for people to visit and learn about the countryside.

4.7.2 There are four elements to the Environmental Stewardship Scheme (Natural England, 2012b):

- Entry Level Stewardship: provides a straightforward approach to supporting the good stewardship of the countryside. This is done through simple and effective land management that goes beyond the Single Payment Scheme requirement to maintain land in good agricultural and environmental condition. It is open to all farmers and landowners;
- Organic Entry Level Stewardship is the organic strand of Entry Level Stewardship. It is geared to organic and organic/conventional mixed farming systems and is open to all farmers not receiving Organic Farming Scheme aid;
- Uplands Entry Level Stewardship was launched in February 2010 to support hill farmers with payments for environmental management. This strand of Environmental Stewardship succeeds the Hill Farm Allowance. It is open to all farmers with land in Severely Disadvantaged Areas, regardless of the size of the holding; and
- Higher Level Stewardship involves more complex types of management and agreements are tailored to local circumstances. Higher Level Stewardship applications will be assessed against specific local targets and agreements will be offered where they meet these targets and represent good value for money.

4.7.3 The Environmental Stewardship Scheme builds on Defra's previous agri-environmental schemes. Historical agreements under the Environmentally Sensitive Areas Scheme and Countryside Stewardship Scheme are in some

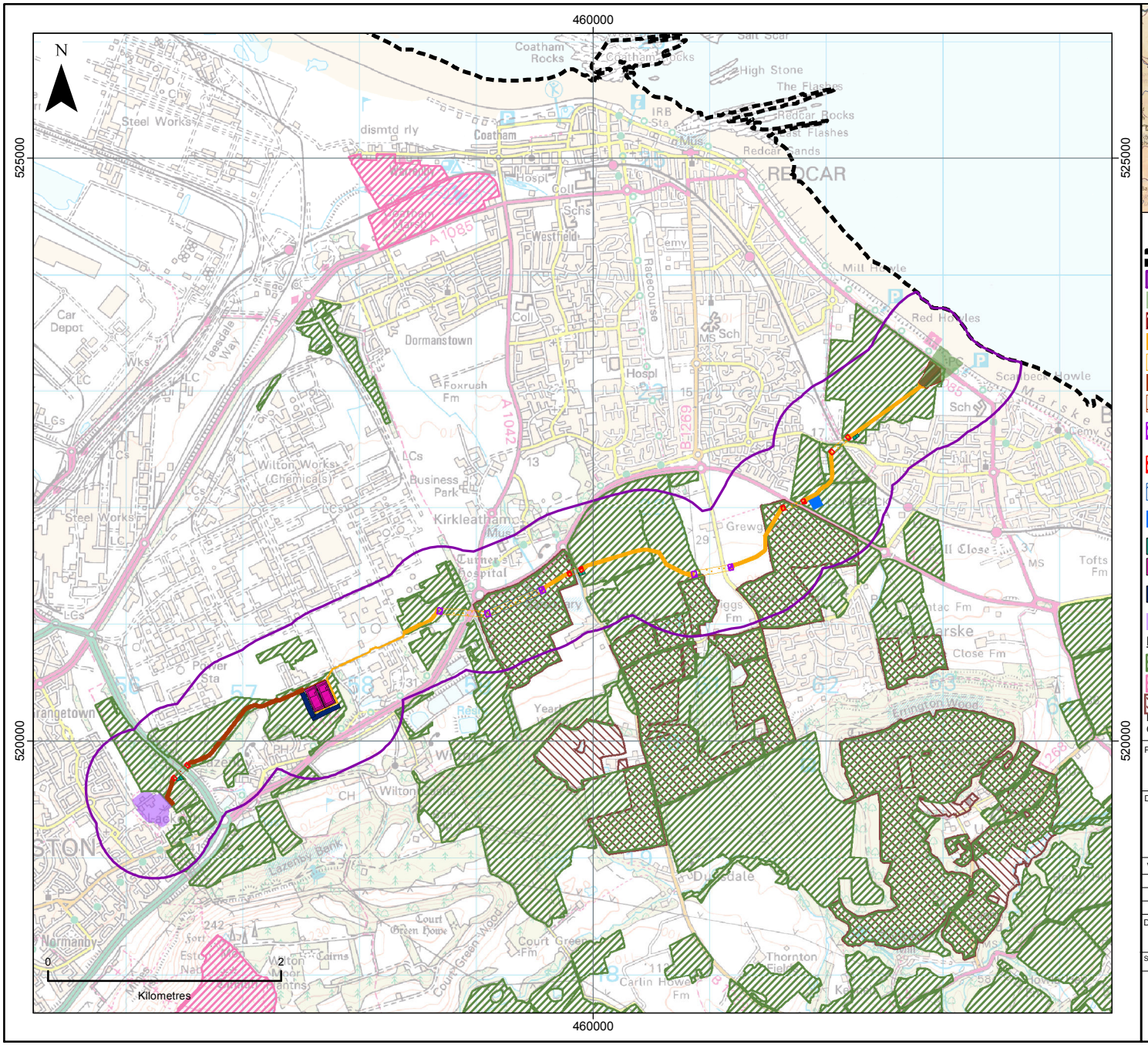
cases still continuing and are therefore also discussed where relevant in this chapter. The objectives of these are similar to the objectives of the Environmental Stewardship Scheme described in paragraph 4.7.1.

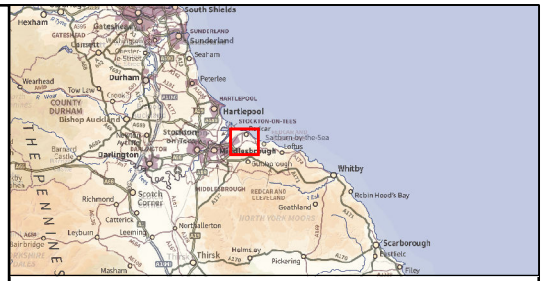
4.7.4 Natural England provides information on these agreements in GIS form at http://www.gis.naturalengland.org.uk/pubs/gis/GIS_register.asp. The location of the agreements within the Direct Impacts Study Area are shown in **Figure 4.7**.

4.7.5 There are a number of Environmental Stewardship agreements within the Direct Impacts Study Area, of which there is approximately 432ha of land within some form of Environmental Stewardship. This represents 44% of the Study Area. However, it should be noted that the mapping from Natural England identifies the parcels of land that are subject to agreements. It does not identify the specific areas of land that are under specific management (e.g. the location of wildlife friendly strips within parcels of land). Therefore the area of land active within these schemes is likely to be significantly less than the 432ha area.

4.7.6 Within the Direct Impacts Study Area the following schemes have been identified:

- Four Countryside Stewardship Agreements;
- 22 Entry Level Stewardship Agreements;
- No Entry Level plus Higher Level Agreements (i.e. both type of agreements are in place);
- No Higher Level Agreements;
- No Organic Entry Level Agreements; and
- No Organic Entry Level Agreements plus Higher Level Stewardship.





LEGEND

- Indirect Impacts Study Area - Redcar and Cleveland Borough
- Direct Impacts Study Area - 500m Buffer
- Teesside A&B cable landfall envelope
- Teesside A&B landfall construction envelope
- Teesside A&B HVDC, Open trench
- Teesside A&B HVDC, HDD
- Teesside A&B HVAC, Open trench
- Teesside A&B HVAC, HDD
- Teesside A&B major horizontal directional drill entry or exit locations (2,000m²)
- Teesside A&B minor horizontal directional drill entry or exit locations (1,200m²)
- HDD or open trench to be confirmed
- Teesside A&B cable route primary construction compound (10,000m²)
- Teesside A&B intermediate construction compound (784m²)
- Teesside A&B converter stations
- Teesside A&B converter stations construction compounds (10,000m² per project)
- Lackenby 400kV substation

Environmental Stewardship Scheme

- Entry Level Stewardship
- Higher Level Stewardship
- Countryside Stewardship Agreements

Data Source:
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PROJECT TITLE

DOGGER BANK TEESSIDE A & B

DRAWING TITLE

Figure 4.7: Environmental Stewardship Scheme agreements

VER	DATE	REMARKS	Drawn	Checked
3	02/07/2013	Draft	SW	JB
4	30/08/2013	Submit for PEI3	SW	JB
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DRAWING NUMBER: **F-ONL-MA-403**

SCALE	1:50,000	PLOT SIZE	A4	DATUM	OSGB36	PROJECTION	BNG

FOREWIND

5 Assessment of Impacts – Worst Case Definition

5.1 Introduction

5.1.1 This section establishes the realistic worst case scenario for each category of impact as a basis for the subsequent impact assessment. For this assessment this involves a consideration of the construction scenarios (i.e. the manner in which the Dogger Bank Teesside A & B will be built out), as well as the particular design parameters of each project (such as the maximum construction footprint at the landfall) that define the Rochdale Envelope[1].

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 land use and agriculture assessment, the realistic worst case scenarios, taking these options into consideration, 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 below, it is not considered to have a material bearing on the outcome of this assessment. For example: the number of vehicles required during construction will not affect either the sensitivity of the land use receptor or the magnitude of effect on that receptor and therefore is not considered relevant to this 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 **Chapter 5** provides details of the three overarching construction scenarios associated with the onshore construction of Dogger Bank Teesside A & B.

5.2.2 The specific timing of construction of the two projects will be determined post consent and therefore a Rochdale Envelope approach has been undertaken for the EIA. There are four key principles that form the basis of the Rochdale Envelope, relating to how the projects will be built. 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 to up to five years; and

[1] As described in **Chapter 5 Project Description** 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

- Partial installation of elements of the second project may be completed during the construction of the first project, e.g. Through the use of ducts to provide conduits for a later cable installation.

5.2.3 To determine which construction scenario is the realistic worst 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.

5.2.4 To ensure that the Rochdale Envelope incorporates all three overarching onshore construction scenarios (as outlined in **Chapter 5**), both the maximum duration effects and the maximum peak effects have been considered for each onshore 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.

5.2.5 The four construction scenarios for Dogger Bank Teesside A & B considered within the onshore assessment for land use and agriculture impacts are therefore:

i. Build A in isolation;

ii. Build B in isolation;

iii. Build A and B concurrently – provides the worst 'peak' impact and maximum working footprint; and

iv. Build the first project, followed by a gap of up to five years before building the second project (sequential) – provides the worst 'duration' of impact.

5.2.6 For the land use and agriculture assessment the impacts relate to the total footprint potentially affected, which will be the same for either project. As such, only one assessment for the single project scenario is presented as impacts for either Dogger Bank Teesside A or B are considered to be representative of either project that is built.

5.2.7 As with the single project, the key factor in determining impacts from scenarios iii and iv relates to the total area affected, rather than the relative timings of the works. This will be the same for either scenario iii or iv. However it is considered that the level of impacts will be greater if the impacts are extended over a longer period and therefore the sequential build scenario is taken forwarded in this assessment.

5.2.8 As such, the construction scenarios assessed within this chapter are:

- Single project (representative of either Dogger Bank Teesside A or B); and
- Two projects - sequential build.

5.3 Operation 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
- Two projects to operate concurrently.

5.3.2 For the land use and agriculture assessment the impacts relate to the total area affected, which would be the same for either project. As such, only one assessment for the single project scenario is presented and is considered representative for whichever project is operating in isolation.

5.3.3 The two operation scenarios for Dogger Bank Teesside A & B considered within this assessment are therefore:

- Single project; and
- Concurrent project.

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, in which case a sequential decommissioning scenario would be considered worst case.

5.5 Design criteria

5.5.1 The realistic worst case scenarios for the range of design criteria taken forward for assessment within this chapter are presented in **Table 5.1**. The identified worst case scenarios are also applied to the CIA.

Table 5.1 Realistic worst case scenario for the assessment of land use and agriculture impact

Impact	Realistic worst case scenario	Rationale
Construction		
All impacts	*All construction phasing scenarios* • Where there is flexibility in the type of ditch crossing to be used (either HDD or open trench) an open trench method has been assumed for the worst case; • The cable burial depth will vary at certain locations dependent upon underlying geology, existing land use practices, surface features that need to be crossed (i.e. roads, railway, river). 1.2m is considered to be the average burial depth; • The location of the underground jointing inspection pits will inevitably vary, but it is assumed that they will be sited, where possible, close to field boundaries.	Maximum values provided within the project details

Impact	Realistic worst case scenario	Rationale
	Single project • Maximum construction period of a single project = 36 months; • Maximum HVDC corridor open trench dimensions = 6km x 18m • Maximum HVAC corridor open trench dimensions = 2km x 20m • Maximum HVDC primary site compounds = 1 x 5000sqm • Maximum HVDC intermediate site compounds = 2 x 784sqm • Maximum HVAC intermediate site compound = 1 x 784sqm • Maximum HVDC minor HDD compounds = 6 x 1200sqm • Maximum HVDC major HDD compounds = 5 x 2000sqm • Maximum HVAC HDD compound = 2 x 1200sqm • Maximum converter station site (during construction) = 5ha *Two projects - sequential build* • Maximum construction period of two projects = 36months x 2 = 72 months (with up to 5 year gap); • Maximum HVDC corridor open trench dimensions = 6km x 36m • Maximum HVAC corridor open trench dimensions= 2km x 39m • Maximum HVDC primary site compounds = 2 x 5000sqm • Maximum HVDC intermediate site compounds = 4 x 784sqm • Maximum HVAC intermediate site compounds = 2 x 784sqm • Maximum HVDC minor HDD compounds = 12 x 1200sqm • Maximum HVDC major HDD compounds = 10 x 2000sqm • Maximum HVAC HDD compound = 4 x 1200sqm • Maximum converter station site (during construction) = 10ha Land surrounding the underground jointing pits for the second project will be excavated twice	Maximum values provided within the project details Maximum values provided within the project details
Operation		
Land taken out of existing use Loss of areas subject to environmental stewardship agreements	*Single project* • Maximum total operational land take = 4ha (2ha converter and 2ha mitigation screening) • No above ground features along the cable route, apart from marker posts for below ground jointing pits	Maximum ranges provided within project details.

Impact	Realistic worst case scenario	Rationale
	Two projects - concurrent • Maximum total operational land take = 8ha (4ha converter stations and 4ha screening) • No above ground features along the cable route, apart from marker posts for below ground jointing pits	Maximum ranges provided within project details.
Soil heating Restrictions on land use practices	*Single project* • Maximum area immediately above HVDC cable open trench = 1.5m x 6km; • Maximum area immediately above HVAC cable trench = 1.5m x 2km *Two projects - concurrent* • Maximum area immediately above HVDC cable open trench = 1.5m x 6km x 2 • Maximum area immediately above HVAC cable trench = 1.5m x 2km x 2	Maximum values provided within project details. Maximum values provided within project details.
Secondary impacts Impact on land drainage systems	*Single project* • Maximum total operational land take = 4ha (2ha converter and 2ha mitigation screening) • Maximum area immediately above HVDC cable open trench = 1.5m x 6km; • Maximum area immediately above HVAC cable trench = 1.5m x 2km *Two projects - concurrent* • Maximum total operational land take = 8ha (4ha converter stations and 4ha screening) • Maximum area immediately above HVDC cable open trench = 1.5m x 6km x 2 • Maximum area immediately above HVAC cable trench = 1.5m x 2km x 2	Maximum values provided within project details. Maximum values provided within project details.
Decommissioning		
All impacts	• Buried cable system left in situ; • Dismantling and removal of above ground electrical equipment; • Removal of any building services equipment; • Demolition of the buildings and removal of security fences; • Removal of hard standing; and • Landscaping and reinstatement of the site.	Maximum values provided within project details.

6 Assessment of Impact During Construction

6.1 Introduction

6.1.1 Reference should be made to **Chapter 5** of the ES for full details of the activities proposed during the construction phase. However, in summary, the activities considered likely to impact on land use and agriculture are:

- Construction of onshore cable systems including landfall joint transition bays and underground cable jointing pits – installation techniques include open cut trenching and horizontal directional drilling (HDD);
- Construction of two new onshore converter stations, associated infrastructure and landscaping;
- Temporary construction compounds / HDD compounds/ laydown areas;
- Temporary upgrade of existing access tracks, construction of new access tracks and haul roads;
- Stockpiling of topsoil and subsoil;
- Re-use of excavated soil in trenches;
- Disposal of excess spoil; and
- Removal and reinstatement of existing drainage systems.

6.1.2 The following potential impacts have been identified in relation to the construction phase on land use and agriculture:

- Land taken out of existing use;
- Land isolated due to construction activities, and effectively taken out of existing use;
- Loss of areas subject to Environmental Stewardship Agreements;
- Degradation of soils (including soil compaction);
- Loss of soil resource;
- Impacts on land drainage systems;
- Biological contamination;
- Disturbance and nuisance; and
- Secondary impacts e.g. Loss of earnings associated with the above impacts.

6.1.3 Each construction scenario is considered as described in Section 5, or grouped where there is considered to be no difference in impact between the different scenarios.

6.1.4 As mentioned in Section 5, in order to facilitate the connection into the existing NGET substation at Lackenby, National Grid will need to undertake enabling works. These works will be within the existing substation footprint and therefore

no impact on land use and agriculture is anticipated and is therefore not discussed further in this chapter.

6.2 Embedded mitigation

6.2.1 During the site selection and assessment of alternative process a number of design decisions were made that will inherently reduce the impact on land use and agriculture. Most importantly these were:

- Development footprint minimised to smallest technically feasible area;
- Siting of development within agricultural land as opposed to other land uses; and
- Minimisation of areas of land that will become isolated or inaccessible during construction by following existing field boundaries.

6.2.2 The cable route selection process is described fully in **Chapter 6 Assessment of Alternatives** of the ES.

6.3 Land taken out of existing use

Single project

6.3.1 Due to health, safety and technical requirements during construction, works areas will be fenced off and not accessible to landowners, occupiers or the public for the duration of the construction period. Based on the worst case assumptions outlined in **Table 5.1**, **Table 6.1** shows the total construction land take area for a single project.

Table 6.1 Estimates of land take during construction of a single project

Element/ Dimension	Land Take per Single Project (Ha)
HVDC route construction corridor	12.6
HVDC route construction compounds	0.7
HVDC route HDD compounds	1.7
HVAC route construction corridor	4.0
HVAC route construction compounds	0.1
HVAC route HDD compounds	0.2
Converter stations construction land take	5.0
TOTAL	**24.3**

6.3.2 As mentioned in Section 6.2 there is also the potential for areas of land to become isolated or inaccessible during construction. These areas of land have been minimised through the route selection process as described in **Chapter 6** of the ES. The cable route has been routed along field boundaries where practical to reduce this impact, and access to fields will be maintained wherever possible through careful construction planning. Access for farm vehicles, to land severed by the works, will be maintained where practicable in consultation with individual landowners and occupiers, and where necessary, crossing points will be agreed pre-construction.

6.3.3 At this stage it is not possible to calculate the area of land that will become isolated or inaccessible. Access to individual fields will be arranged as part of the detailed construction planning. It is however likely that relatively small areas or strips of land will be subject to the effect and for the purpose of this assessment this area is estimated to be less than 5ha. Therefore the total area affected by a single project is estimated to be 29.3ha (comprising 24.3ha direct land take plus 5ha isolated land).

6.3.4 Based on the information provided in Section 4 approximately two thirds of the construction footprint will be within areas currently associated with agricultural production. This would result in 18.3ha of agricultural land taken out of agricultural use during construction.

6.3.5 The majority of the remaining third of the land within the construction footprint has been identified as industrial; this is within the Wilton Complex. However a large area of this, including the converter stations site, is greenfield land currently used for agriculture or grassland. This is despite it being identified for industrial development and is therefore assessed accordingly.

6.3.6 Other land uses through which the cable route crosses include where it follows roads and associated verges, field boundaries and watercourses.

6.3.7 The area affected as a percentage of the available agricultural land within South Teesside (12,321ha; see Section 4.6) is 0.15%.

6.3.8 Based on the figures given in Section 4.5 it is likely that approximately 40% (7.3ha) of the agricultural land affected will be Grade 2 and 15% (2.7ha) Grade 3. The remaining land is classified as non-agricultural or urban.

6.3.9 The precise duration of impacts on land take is dependent on the timing of the construction sequence. Adopting a precautionary approach for the purpose of this assessment, the maximum construction period of up to 36 months for a single project is applied to the entire 29.3ha (i.e. including converter stations, cable route working width, construction compounds and isolated land). In reality the impact is likely to be considerably shorter at any given location. Given the linear nature of the cable route construction, where possible, reinstatement of sections will occur as individual sections are installed. The exact timing and duration of works at any location are not known at this time.

6.3.10 The sensitivity of the receptor is considered to be high given the quality of the agricultural land, mainly the presence of grade 2 land (**Table 3.1**). The magnitude of effect is considered to be low (**Table 3.2**), based on the numbers given above and given that there is no permanent change to land use for the cable route, with only temporary restriction to agricultural activities. Furthermore the area affected along the cable route is low as a percentage of the regional resource. This is relevant as the proportion of the regional resource affected will have implications on the sensitivity of receptor, for example a BMVL may be scarce in remote upland areas. The permanent operational land take at the converter stations is considered in Section 7. Mitigation measures are presented in **Table 6.2**.

Table 6.2 Land taken out of existing use – mitigation measures

Mitigation measures
• Following the completion of the construction stage the majority of the areas will be reinstated to their former condition and land use. The exception to this is the land at the converter stations site which is discussed within the operational impacts section; and • The construction footprint will be minimised where possible and land reinstated to its former condition as soon as reasonably possible following cable installation, dependent on weather conditions.

6.3.11 During construction it is unavoidable that land along the cable route will temporarily be taken out of its existing land use. The implementation of the mitigation will reduce the duration of the effect, however the magnitude will remain the same (low). Following reinstatement the previous land use will continue as before on the majority of the land affected, and a **minor adverse** residual impact is predicted along the cable route. The impact of land use change at the converter stations site is considered to be a **minor adverse** residual impact given the relatively small area impacted as a proportion of the available agricultural land resource in the region.

Two projects - sequential

6.3.12 Should both projects be constructed the effects will be similar to that described for a single project; however the area impacted will be approximately doubled.

6.3.13 **Table 6.3** shows the total area taken out of its current land use during the construction of two projects.

Table 6.3 Estimates of land taken out of existing use during construction (two projects)

Element/ Dimension	Land Take for Both Projects (Ha)
HVDC route construction corridor	25.2
HVDC route construction compounds	1.3
HVDC route HDD compounds	3.4
HVAC route construction corridor	7.8
HVAC route construction compounds	0.2
HVAC route HDD compounds	0.5
Converter stations construction land take	10.0
TOTAL	**48.4**

6.3.14 The area of land subject to isolation will remain the same as that estimated for a single project (5ha), as either a single or both projects will result in the same barrier that prevents access to the parcels of land.

6.3.15 Approximately two thirds of the total land area affected (48.4ha) is currently used for agriculture. This is 0.27% of the available agricultural land within South Teesside (12,321ha; see Section 4.6). Based on the figures given in Section 4.5 approximately 40% (13.3ha) of the agricultural land affected will be Grade 2 and 15% (5.0ha) Grade 3. The remaining land is likely to be Grade 4 or 5, or non-agricultural.

6.3.16 The maximum construction period for the sequential scenario is 72 months. Construction of each project can take up to 3 years with a gap of up to 5 years between construction of the first and second project. Therefore the time for which land is not in its current use is extended to potentially a combined period of 72 months. Following the completion of the construction stage the majority of the areas will be reinstated to their former condition and land use (**Table 6.2**). This doubling of the construction duration, increases the time of the temporary land use impacts and increases the magnitude of effect to medium (**Table 3.2**). The sensitivity of the receptor remains as high given the quality of agricultural land (**Table 3.1**). The mitigation presented in **Table 6.2** will be implemented which will reduce the magnitude of the effect from medium to low (**Table 3.2**). The residual impact will remain as **minor adverse**.

Single project

6.3.17 During the construction period for either project there will be the potential for impacts on Environmental Stewardship Agreements. The effect on individual landowners/occupiers is likely to be specific to their own scheme, which will need to be discussed between the future developers and operators of the development, landowners/occupiers and Natural England prior to construction. The impacts could range from the agreement ceasing entirely to no impact on the agreement, depending on the agreement objectives and location of the works. As such, this assessment looks at the effects in general terms rather than on an agreement by agreement basis. Two connected impacts are anticipated as a result of this:

- Ecological – in terms of the loss of the agreements and the substantive agri-environmental objectives of the scheme; and
- Financial - in terms of the loss of the agreements and the impact on overall farming income.

6.3.18 A maximum construction period of 36 months for each individual project has been considered for the entire onshore development area. Following the completion of construction, all areas subject to Environmental Stewardship Agreements (with the exception of the converter stations site) will be reinstated to their former condition and thus there is no reason why the same or similar agreements cannot be reinstated following construction.

6.3.19 The preferred cable route alignment follows field boundaries wherever practicable. Other features that are likely to be subject to agreements, such as trees and ponds have been avoided where practicable. A number of ditches and hedgerows will be crossed; however these will be crossed at right angles wherever possible to minimise disturbance to those features, and reinstated following completion of the works.

6.3.20 There is potential for a certain amount of disruption to the Environmental Stewardship Agreements as a direct result of loss of land during the construction works. It is considered that the magnitude of effect will be medium due to the overall size of the onshore footprint and the extent of agreements within the Direct Impacts Study Area (**Table 3.2**). The sensitivity of receptors is

considered to be medium (**Table 3.1**). Mitigation measures are shown in **Table 6.4**.

Table 6.4 Environmental Stewardship – mitigation measures

Mitigation measures
• Full and continued consultation with landowners/occupiers will be undertaken, and advice sought during the site planning and construction phase, to ensure that the potential impacts of construction activities upon land in Environmental Stewardship are minimised. This will be achieved through, for example the phasing of works to allow new environmental stewardship sites to be identified before existing stewardship sites are impacted; and • Landowners/occupiers will be compensated for any resultant losses incurred as a direct consequence of the works.

6.3.21 Full and continued consultation with landowners and occupiers and seeking advice from Natural England during the site planning and construction phase will ensure that the magnitude of any effect is reduced to low. Whilst the land will remain out of Environmental Stewardship for the duration of the works, the revenue generated from that land will be compensated and the ecological impact will be temporary, as such a **negligible** residual impact is predicted.

Two projects - sequential

6.3.22 If Dogger Bank Teesside A & B are constructed sequentially, the number of agreements affected remains the same and the sensitivity will therefore remain as medium. The overall duration of the potential effect on each stewardship scheme will increase due to the increased construction period. However, the magnitude of effect is considered to remain the same (medium) following the implementation of the mitigation measures described for an individual project (**Table 6.4**). Therefore the residual impact is assessed to be **minor adverse** under this sequential build scenario.

6.4 Degradation of soils

Single project

6.4.1 Activities undertaken during the construction period of the project have the potential to impact on the quality of the soil resource. The following activities have been identified with the potential to degrade the existing soil resource:

- Intrusive pre-construction technical and environmental surveys;
- Topsoil stripping of the working width of the cable route, converter stations site and temporary works areas;
- Landscaping and earthworks at the converter stations site;
- Removal of vegetation;
- Construction and operation of the haul road within the cable route working width;
- Operation of construction compounds;
- Excavation of cable trenches;

- Storage of topsoil and subsoil;
- Cable installation;
- Cable jointing and drilling at HDD sites;
- Imported stabilised back fill material; and
- Reinstatement of subsoil and topsoil.

6.4.2 There is the potential for soils to be compacted and soil structure to deteriorate especially along access routes, haul roads and where heavy materials or equipment is stored. The result is reduced biological activity, porosity and permeability and increased strength. It can also lead to reduced water infiltration capacity and increased risk of erosion (European Commission, 2008). The effect of all of these impacts is usually reduced fertility and crop yields.

6.4.3 If soils are not stored or reinstated correctly, or are compacted, there is potential to lose the definition of soil profiles, which can lead to homogenisation of the soil. Again this may reduce fertility and crop yields. As well as the physical changes to the soil resource, there is also the potential to impact on the chemical, pH and organic content in soils.

6.4.4 The potential for soils to become contaminated as a result of construction activities is considered separately in **Chapter 24**.

6.4.5 Given the characteristics of the soils as described in Section 4.4 the sensitivity of the receptor to these impacts is considered to be high (**Table 3.1**). In the absence of appropriate mitigation measures the magnitude of effect is considered to be medium given that the land will be expected to recover within 5 years. The mitigation measures presented in **Table 6.5** are proposed.

Table 6.5 Degradation of soils – mitigation measures

Mitigation measures
• Soils handled, stored and reinstated by a competent contractor under Defra (2009) Construction code of practice for the Sustainable Use of Soils on Construction Sites; • Topsoil will be stripped within all construction areas and stored adjacent to where it is extracted where practical; • The subsoil excavated will be stored separately from the topsoil, with sufficient separation to ensure segregation; • During wet periods, construction methods will be limited where vulnerability to soil compaction is identified; • Heavy plant and vehicles will only be able to use specific routes; • The excavation footprint will be minimised where possible; • In circumstances where construction has resulted in soil compaction, further remediation will be undertaken, through an agreed remediation strategy; • Detailed pre and post soil condition surveys to a minimum depth of 1.5 will be undertaken to allow mitigation measures to be appropriately designed and to monitor the success of the soil reinstatement, typically surveys would be undertaken for each landowner; • The surveys will also include soil descriptions to be used to identify the soil's susceptibility to damage through the mechanism of compaction; and • Detailed method statements will be produced and agreed with the relevant regulator, in advance of the works. Contractors will be required to comply with these.

6.4.6 Following implementation of these mitigation measures the magnitude of the effect will be reduced from medium to low with no long-term effects on soil. As such, the residual impact is assessed as **minor adverse**.

Two projects - sequential

6.4.7 Whilst the overall duration of impact for a sequential build will increase compared to the single project, it will not increase on specific soils (i.e. individual soils will only be subject to effects for a maximum of 36 months, as the construction areas for the two projects are adjacent but distinct to one another).

6.4.8 The sensitivity of receptor is considered to be high and the magnitude of effect also high given the doubling of the area of soils affected. However with the implementation of the measures outlined for the single project (**Table 6.5**) the magnitude of the effect will be reduced to medium (**Table 3.2**), and thus the residual impact is assessed as **minor adverse**.

6.5 Loss of soil resource

Single project

6.5.1 Two mechanisms which may result in a reduction of the quantity of high quality soils have been identified and are discussed below.

6.5.2 The first mechanism is erosion by either wind or water. In certain weather conditions for certain soil types there is the potential for soils to be eroded during excavation, storage or following reinstatement. Given the nature of the soil resource within the Direct Impacts Study Area, it is considered that the soils are seasonally vulnerable to this effect, and thus their sensitivity is considered to be medium[2] (**Table 3.1**). Given the extent of the areas to be excavated and the degree of potential erosion, the magnitude of the effect is considered to be medium (**Table 3.2**). Mitigation measures are outlined in **Table 6.6**.

Table 6.6 Loss of soil resource (erosion) – mitigation measures

Mitigation measures
• Adherence to the MAFF (2000) Good Practice Guide for Handling Soils and Defra (2009) Construction code of practice for the Sustainable Use of Soils on Construction Sites. • These include: o Only working in appropriate weather conditions where soil type dictates; o Appropriate soil storage; o Maintaining effective field drainage systems during construction; o Ensuring reinstatement of individual fields occurs as soon as practical after construction; and o Planting vegetation shortly afterwards.

6.5.3 The implementation of the measures outlined above will ensure that the magnitude of this effect is reduced to low (**Table 3.2**). As such a **negligible** residual impact is predicted associated with soil erosion.

[2] The European Commission (2004) has undertaken a Pan European Soil Erosion Risk Assessment. Whilst this focuses on land under agricultural production and not during construction of a project of this nature, it gives an indication of the soils susceptibility to erosion. It suggests that current loss within the study area through erosion is low, between 0 and 5 tonnes per hectare per year, which is consistent with the medium sensitivity attributed.

6.5.4 The second mechanism whereby the soil resource can be reduced is by the excavation, removal and offsite disposal of soils. This will occur either as a result of material being identified as contaminated or unsuitable material for bedding of cables or jointing (where imported stabilised backfill will be required); or unsuitable / not required for earthworks or landscaping at the converter stations site. It is anticipated that material excavated at the converter stations site as part of the site preparation earthworks will be reused for landscaping purposes within the site where possible, with only potentially contaminated material requiring removal from site. Any contaminated soils found at either of the converter stations site or cable route will be removed as per the best practice procedures set out in **Chapter 24**.

6.5.5 The vast majority of this will be subsoil and not topsoil as it will be removed from the depth where the cable system is installed. Given the medium quality of soils, the sensitivity of receptor to this effect is considered to be medium (**Table 3.1**) and the volume of material to be excavated represents an effect of low magnitude (**Table 3.2**). Mitigation measures are outlined in **Table 6.7**.

Table 6.7 Loss of soil resource (excavation) – mitigation measures

Mitigation measures
• Soils will be reinstated where possible; and • If this is not feasible then soils may be re-used on site where a need has been identified within the site Waste Management Plan (**Appendix 24C**), which has been prepared and discusses the disposal options and waste hierarchy in more detail.

6.5.6 Following the implementation of the measures outlined above, the magnitude of effect is considered to reduce from low to negligible. As such, the residual impact, in terms of the permanent loss of soil resource through excavation, is considered to be **negligible**.

Two projects - sequential

6.5.7 With regards to erosion by either wind or water, given the increased extent of the areas to be excavated with the construction of both projects, the magnitude of the effect is considered to increase to high (**Table 3.2**) without mitigation. The sensitivity of the soil resource remains medium (**Table 3.1**).

6.5.8 Mitigation remains the same as that outlined for a single project (see **Table 6.7**) and is focussed on adherence to the MAFF (2000) Good Practice Guide for Handling Soils and Defra (2009) Construction code of practice for the Sustainable Use of Soils on Construction Sites. The implementation of the measures outlined for a single project will ensure that the magnitude of this effect for both projects is reduced from high to medium (**Table 3.2**). As such a **minor adverse** residual impact is predicted associated with soil erosion.

6.5.9 With regards to reduction of the soil resource itself, the quantity of soil expected to be excavated during the construction of the cable route will be doubled. The sensitivity of the receptor to this effect is considered to remain as medium (**Table 3.1**) and the volume of material to be excavated associated with two projects represents an increase in effect to medium magnitude.

6.5.10 As with the single project (see **Table 6.7**) soils will be reinstated where possible or re-used on site in accordance with the waste hierarchy identified within the Site Waste Management Plan (**Appendix 24C**).

6.5.11 Following the implementation of the mitigation measures, the magnitude of effect is considered to reduce from medium to low. As such, the residual impact, in terms of loss of soil resource, is considered to be **negligible**.

6.6 Impact on land drainage systems

Single project

6.6.1 During construction some temporary impacts on land drainage within agricultural fields will be unavoidable. This includes field drains, ditches and dykes. The largest impact is expected where field drains are present, whether subsurface, surface or mole drains. Drains are likely to be at a depth of between 0.5m and 1.5m and be made of ceramic, plastic or other appropriate materials and therefore will be impacted by any excavation works planned through agricultural fields. It will be necessary to truncate drainage systems temporarily during excavation and installation and re-instate following construction of the cable route. At the converter stations site any existing field drainage will be permanently altered as the land will be taken out of use during the operation of the project.

6.6.2 Given the soil types found it is expected that some sections of the cable route will have existing field drainage systems in place. Given the above, the sensitivity of receptor is considered to be high (**Table 3.1**) and, without mitigation, the magnitude of the effect is considered to be medium (**Table 3.2**).

6.6.3 Mitigation measures are proposed in **Table 6.8**. However it should be noted that these will be dependent upon the field by field characteristics of soils, weather conditions, existing drainage arrangements and crops grown.

Table 6.8 Land drainage – mitigation measures

Mitigation measures

• Consultation with landowners and occupiers to establish existing drainage arrangements, location of drains (ideally access to drainage plans where available) and any other information;
• Working method statements produced for different drainage systems;
• Excavation of soil should only occur in suitable weather conditions, dependent on soil type;
• Where necessary the following techniques will be considered:
  o Installation of pre-construction header drains on the uphill side of the working strip;
  o Post-construction drains installed and stone backfill if required; and
  o In areas of clay subsoil, pre-construction drainage will be installed to maintain existing drainage systems and avoid disruption to the cable installation due to water collecting in the excavated trenches.
• Post construction, drains will be fully re-instated to their former condition and functioning, where possible;
• Minimisation of the period for which drains are not fully operational; and
• Where surface drains and ditches are encountered, and crossed via open-cut installation techniques they will be dammed and a pipe or pump will be installed to ensure water flow is maintained during the cable installation process.

6.6.4 Providing that these measures are successfully implemented the magnitude of the effect is considered to be reduced to low (**Table 3.2**). This is due to the fact that land drainage reinstatement techniques are well established and are often required periodically within agricultural land as part of general maintenance requirements. Following implementation of these mitigation measures the residual impact will be **minor adverse**.

Two projects - sequential

6.6.5 The realistic worst case sequential scenario considered was a single project being constructed with up to a 5 year gap before the second project is constructed. This impact is considered to be considerably worse than the concurrent build scenario as land drains will need to be removed from the construction working width of the first project prior to construction and reinstated following completion, and subsequently the adjacent section removed prior to construction of the second project and reinstated after completion. This will certainly be the case where field drains run perpendicular to the cable trenches.

6.6.6 The sensitivity of the receptor remains as high (**Table 3.1**). The magnitude of effect associated with this sequential build scenario is considered to be high (**Table 3.2**). The mitigation measures outlined for the single project (**Table 6.8**) remain valid for the sequential build scenario. Provided the measures outlined in **Table 6.8** are successfully implemented the magnitude of the effect is considered to reduce from high to medium, as land drainage reinstatement techniques are well established. Following implementation of these mitigation measures the residual impact is still deemed **minor adverse** for the sequential build scenario.

6.7 Biological contamination

Single project

6.7.1 There is potential for biological contamination to occur between different agricultural land holdings and between individual fields, particularly where tracked vehicles are crossing between field and landowner boundaries. This could include animal and plant diseases and the spread of noxious or invasive weeds. Whilst no specific concerns have been identified, the risk remains in all agricultural settings and is enhanced by the movement of vehicles, equipment and people between adjacent fields and properties. The sensitivity of the receptors has been assessed as medium (**Table 3.1**) and the magnitude of the effect is also considered medium (**Table 3.2**).

6.7.2 Transfer of any plant and animal diseases will be minimised by adhering to good practice construction and agricultural practices. The spread of invasive weeds would represent an offence under the Wildlife and Countryside Act 1981 (as amended), and will be avoided through standard construction practices. Including the Environment Agency (2010) Guidance: Managing Invasive Non-native Plants.

6.7.3 Biosecurity measures will be employed to prevent the spread of disease. This includes measures and protocols designed to prevent disease causing agents

from entering or leaving a property and being spread. These are outlined in **Table 6.9**.

Table 6.9 Biological contamination – mitigation measures

Mitigation measures
Defra (2003) has identified a number of best practice measures to minimise the risk of spreading disease. These measures include but are not limited to: • Agreeing access arrangements with landowners/occupiers in advance of any construction works taking place; • Minimising where possible the movements of people, vehicles or equipment into areas where farm animals are kept; and • Cleaning equipment upon arrival and departure.

6.7.4 Biosecurity will be addressed during the detailed design phase of the project in discussion with cable installation contractors. The measures above will be implemented and contractors will adhere to the Defra (2003) guidance as a minimum standard.

6.7.5 Thus, following the implementation of the mitigation measures discussed above it is considered that the magnitude of the effect will reduce to low (**Table 3.2**) and the residual impact will be **negligible**.

Two projects - sequential

6.7.6 The potential for biological contamination remains the same as that identified for a single project. The sensitivity of receptor remains as medium (**Table 3.1**), however the increased number of vehicles and personnel represents an increase to a high magnitude of effect (**Table 3.2**).

6.7.7 The measures outlined for a single project (**Table 6.9**) will be adhered to for the sequential scenario. Following the implementation of these measures the magnitude of the effect will reduce to low and the residual impact is therefore assessed as **negligible**.

6.8 Disturbance and nuisance

Single project

6.8.1 As well as the direct impacts on land use and agriculture, there is the potential to cause disturbance and nuisance to landowners and occupiers during the construction stage. This is mostly associated with noise and vibration (**Chapter 29 Noise**), traffic and access (**Chapter 28**) and dust and air quality (**Chapter 30 Air Quality**), and each of these is covered within the respective chapters of this ES.

6.8.2 In addition to these there is the potential for landowners and occupiers to be inconvenienced throughout the construction phase by the physical presence of workers on their land, issues regarding safety and security and the concerns that this may cause. Whilst these impacts are subjective and concerns are likely to vary between landowners/occupiers, adopting a precautionary approach, the sensitivity of the receptor has been assessed as high (**Table 3.1**) and the magnitude of effect as medium (**Table 3.2**). Measures are outlined in **Table 6.10**.

Table 6.10 Disturbance and nuisance – mitigation measures

Mitigation measures
• Continued regular liaison with landowners and occupiers will continue throughout the construction phase to ensure concerns are alleviated as soon as possible; • Tool box talks/ training for construction workers on minimising the impact; and • A protocol for issues to be raised, considered and addressed will be established and distributed to all landowners/occupiers and contractors.

6.8.3 Implementing the measures described in **Table 6.10** will ensure that the magnitude of the effect is reduced to low (**Table 3.2**), resulting in a **minor adverse** residual impact.

Two projects - sequential

6.8.4 Whichever sequential build scenario is considered it effectively doubles the length of the construction period and therefore doubles the exposure time of landowners and occupiers to the construction activities and potential associated nuisance. Again these impacts are subjective and likely to vary between landowners/occupiers. However, adopting a precautionary approach, the sensitivity of receptor remains as high (**Table 3.1**) and the increased construction period increases the magnitude of the effect to high (**Table 3.2**).

6.8.5 On-going consultation with landowners and occupiers will continue throughout the construction phase to ensure concerns are alleviated as soon as possible (**Table 6.10**). In addition a protocol will be established and distributed to landowners, occupiers and contractors to deal with issues that may occur during the construction phase. This will ensure that the magnitude of the effect is reduced to medium, resulting in a **minor adverse** residual impact.

6.9 Secondary impacts

Single project

6.9.1 Secondary impacts represent the impact on agricultural output and earning potential for users of the land. This impact will be mostly temporary in nature, during the construction phase, and reversible, with the exception of the converter stations site.

6.9.2 The impact on agricultural output will be a function of the size of the area taken out of existing use during construction and any other areas impacted by the previous impacts discussed. In the context of the region as a whole this is not considered to represent a major change; however given the area of land affected (27.5ha), and the potential impact this may have as a percentage of a single land holding, the magnitude of effect is considered medium (**Table 3.2**). Given the characteristics of agricultural output discussed earlier, the sensitivity of the receptor is considered to be medium (**Table 3.1**). Mitigation measures are outlined in **Table 6.11**.

Table 6.11 Secondary impacts – mitigation measures

Mitigation measures
• A commitment will be made within the private treaty agreement between the future developers and operators of the development and the landowner/occupier to compensate for crop loss incurred as a direct consequence of the construction phase of the project.

6.9.3 With the implementation of the mitigation measure, the magnitude of the effect is considered to reduce from medium to low (**Table 3.2**) and a **negligible** residual impact is anticipated.

Two projects - sequential

6.9.4 For both projects the percentage of a single land holding remains an effect of medium magnitude (**Table 3.2**) and the sensitivity of the receptor remains as medium (**Table 3.1**).

6.9.5 With the implementation of the mitigation outlined in **Table 6.11,** the magnitude of the effect is considered to reduce from medium to low (**Table 3.2**). As such, a **negligible** residual impact is anticipated on secondary impacts associated with the sequential scenario.

7 Assessment of Impact During Operation

7.1 Introduction

7.1.1 This section describes the potential impacts arising during the operational phase of the onshore aspects of Dogger Bank Teesside A & B, with respect to land use and agriculture. Reference should be made to **Chapter 5** of the ES for full details of the operational phase, however in summary the activities considered likely to impact on land use and agriculture are:

- The physical presence of the converter stations;
- General site activities at the converter stations (they will be un-manned however monitoring and maintenance activities will take place);
- Operation of the buried electrical cable systems; and
- Occasional routine cable system maintenance works - access to underground inspection pits.

7.1.2 In the event of a cable failure, it may also be necessary to re-excavate localised areas (to gain access to jointing pits) to replace / repair the faulty cable along limited stretches. If repair works are required, the mitigation measures outlined for the construction phase will be adhered to, in order to reduce or minimise any potential impacts to an acceptable level.

7.1.3 The following potential impacts have been identified in relation to the operation phase on land use and agriculture:

- Land taken out of existing use permanently;
- Permanent loss of areas subject to environmental stewardship agreements;
- Land drainage systems altered;
- Soil heating;
- Restrictions on land use practices; and
- Secondary impacts, e.g. Loss of earnings associated with the above impacts.

7.2 Embedded Mitigation

7.2.1 During the site selection and assessment of alternatives process a number of design decisions were made that will inherently reduce the impact on land use and agriculture. Most importantly these were:

- Burial of cables at a depth to allow current land uses to continue;
- HDD will be utilised at road and railway crossings to maintain access; and
- Underground Inspection pits located at field boundaries to avoid restricting current land use practices.

7.2.2 The cable route design process is described fully in **Chapter 6** of the ES.

7.3 Land taken out of existing use

Single project

7.3.1 Following completion of the construction phase the majority of land will be reinstated and will revert back to its existing use. The cable system will be buried at a depth which allows the continuation of current agricultural practices above the cable system. The only surface features of the cable system will be markers for the jointing pits. Where possible these will be located at field boundaries and verges and therefore the impact of the cable system on existing land use is assessed as **negligible**.

7.3.2 The only substantial permanent loss of agricultural land will be at the converter stations site. The total area subject to this effect for an individual project is approximately 4ha.

7.3.3 The area affected as a percentage of the available agricultural land within South Teesside (12,321ha; see Section 4.6) is 0.03%. Whilst the figure included in Section 4.6 suggests that this is non-agricultural land, the site visit and aerial photography suggest it is currently in agricultural use. Adopting a precautionary approach it is assumed that this land will be Grade 2 or Grade 3 agricultural land and therefore the project will result in a 4ha loss of the BMVL.

7.3.4 Given the quality of the agricultural land, the sensitivity of the receptor is considered to be high (**Table 3.1**). The magnitude of effect is considered to be medium (**Table 3.2**) given the size of the area affected and the permanent nature of the effect. However, as a proportion of the regional resource it is low. Mitigation measures are outlined in **Table 7.1**.

Table 7.1 Land taken out of existing use – mitigation measures

Mitigation measures
• Land take will be minimised to the area absolutely required to site the converter stations and associated landscaping; and • Forewind is actively involved in negotiations with the current landowners to secure the permanent land take, and compensation will form part of those private treaty discussions.

7.3.5 With the implementation of this measure the magnitude of the effect is considered to reduce to low (**Table 3.2**) and a **minor adverse** residual impact is anticipated.

Two projects - concurrent

7.3.6 The total area subject to this effect for both projects combined will be 8ha. The area affected as a percentage of the available agricultural land within South Teesside (12,321ha; see Section 4.6) is 0.06%. As with the single project scenario for the purpose of this assessment it is assumed the entire 8ha is BMVL.

7.3.7 Given the quality of the agricultural land, the sensitivity of the receptor is considered to be high (**Table 3.1**). The magnitude of effect is considered to be medium (**Table 3.2**) given the size of the area affected and the permanent

nature of the effect. However, as a percentage of the regional resource it is still low.

7.3.8 As for the single project (**Table 7.1**), following the implementation of these measures the magnitude of the effect is considered to reduce to low (**Table 3.2**) and a **minor adverse** residual impact is anticipated.

7.4 Loss of areas subject to Environmental Stewardship Agreements

All Scenarios

7.4.1 The operational impacts associated with loss of areas will be relatively similar whichever scenario is considered given that both converter stations sit within a field subject to a single Environmental Stewardship Agreement. As such, the impacts are considered to be the same should either project be in operation in isolation or both operating together.

7.4.2 It is likely that this Environmental Stewardship Agreement will have to be discontinued. As a result of this the magnitude of effect is considered to be high. The sensitivity of receptor is medium (**Table 3.1**). Mitigation measures are outlined in **Table 7.2**.

Table 7.2 Loss of areas subject to environmental stewardship agreements – mitigation measures

Mitigation measures
• Forewind is actively involved in negotiations with the current landowners to secure the permanent land take, and compensation will form part of those private treaty discussions; and • The landscape screening proposed at the converter stations site will contribute to providing more diverse habitats in the local area compared to an agricultural field and thus it is likely to contribute marginally towards the substantive objectives of the Environmental Stewardship Scheme.

7.4.3 Following mitigation, the magnitude of effect is reduced to low (**Table 3.2**), resulting in a **negligible** impact.

7.5 Land drainage systems altered

All scenarios

7.5.1 The operational impacts associated with disruption to land drainage are not related to the footprint of a single project compared to two projects, but how long land drainage is disrupted. As such, the impacts are considered to be the same should either project operate in isolation or together.

7.5.2 The following measures will ensure the impact on land drainage, as a result of the cable system, is minimised (**Table 7.3**).

Table 7.3 Land drainage – mitigation measures

Mitigation measures
• Following construction, field drainage systems and ditches will be fully reinstated where possible in consultation with landowners/occupiers; • Cable system buried at a depth to allow the continuation of current agricultural practices; • Post-construction monitoring and consultation with landowners/occupiers to ensure reinstatement has been successful; and • In the event of any problems during post-construction monitoring further remediation work will be undertaken.

7.5.3 The existing drainage arrangements at the converter stations sites will not be retained given the change of use from agricultural production to electrical infrastructure. The potential drainage requirements and strategy for avoiding flood risk at the converter stations site are discussed in the Flood Risk Assessment contained as an appendix to **Chapter 24** (**Appendix 24B**).

7.5.4 Given the characteristics of the soils and agricultural practices in the Direct Impacts Study Area the sensitivity of the receptor is considered to be high (**Table 3.1**); however the magnitude of effect is considered low (**Table 3.2**) following mitigation. Following implementation of the mitigation measures outlined in **Table 7.3** the residual impact is deemed **minor adverse**.

7.6 Soil Heating

Single project

7.6.1 The temperature of soil naturally increases with depth; however, during operation of the cable system there is the potential for this thermal profile to be elevated due to heat generated from the electrical cables. This has the potential to impact on soil characteristics, particularly moisture content and crop growth.

7.6.2 The transmission of electricity always results in some energy wastage in the form of heat dissipation due to resistance of the electrical conductor. An important objective of the design of the cable system will to be to minimise such losses, as these ultimately represent a loss of energy transmitted from a generating station to the national grid.

7.6.3 Any heating effect from the cables is only likely to occur immediately adjacent to, or directly above the cable system. The area of agricultural land potentially affected is up to 1.2ha (**Table 7.4**). It should be noted that this is precautionary in nature as it includes the entire trench width; the cables themselves are likely to be considerably smaller in width than this, and the heating effect focused above these.

Table 7.4 Estimates of land potentially affected by soil heating

Element/ Dimension	Single Project
Area immediately above HVDC cable trenches [ha]	0.9
Area immediately above HVAC cable trenches [ha]	0.3
TOTAL [ha]	**1.2**

7.6.4 There are a number of mitigation measures that can be employed during detailed design and construction to ensure electrical losses, and thus heat dissipation, is kept to a minimum. These are outlined in **Table 7.5**.

Table 7.5 Soil heating – mitigation measures

Mitigation measures
The following measures are dependent upon the electrical design, geology, soil type and characteristics, method of installation, depth of cable, weather conditions and electrical loading: • Increasing horizontal separation of cables; • Selecting an optimum cable conduction material and diameter; • Undertaking pre-construction soil thermal resistivity surveys; • Changing the properties of the surrounding material (i.e. importing bedding/ backfill material); and • Increasing the insulation of cables.

7.6.5 Any effect will be highly localised, immediately surrounding the cable system itself. Cables are likely to be buried at a depth of approximately 1.2m; and the principle root growth zone is generally accepted to be within the first 500mm of soil from the surface, although this is dependent on crop, soil type and characteristics and climate. Incorporating the measures outlined above, the design will ensure the root growth zone is generally unaffected, even under peak conditions (i.e. in warm weather, with a full load and for long periods). In reality this is unlikely to occur frequently due to the lower wind resource within summer months. Given the above the magnitude of effect is considered to be low (**Table 3.2**).

7.6.6 The characteristics of the soils and climate found within the study area are considered to be susceptible to soil heating. However, the thermal resistivity of the material immediately surrounding the cables has a much greater bearing on heat dissipation and the backfill will be selected for its properties in this respect. It is therefore considered that the sensitivity of receptor is medium (**Table 3.1**).

7.6.7 The potential impact of any potential soil heating on agricultural production may positively or negatively affect crop growth. Assuming the mitigation measures above are implemented, the residual impact of soil heating is considered to be **negligible**.

Two projects - concurrent

7.6.8 The area potentially subject to this impact if both projects are operational concurrently is 2.4ha (**Table 7.6**).

Table 7.6 Estimates of land potentially affected by soil heating

Element/ Dimension	Both Projects Combined
Area immediately above HVDC cable trenches [ha]	1.8
Area immediately above HVAC cable trenches [ha]	0.6
TOTAL [ha]	**2.4**

7.6.9 The magnitude of effect is likely to be approximately double that of the single project but is still considered to be low (**Table 3.2**) and thus providing the mitigation measures outlined in **Table 7.4** are implemented, the resulting residual impact is assessed as **negligible**.

7.7 Restrictions on land use practices

Single project

7.7.1 Whilst there will be no permanent land take associated with the buried cables, a permanent cable easement will be created. This will ensure that the future developers and operators of the development have the right to maintain, repair, inspect and remove the buried cables. This may restrict certain activities being undertaken within this area. Whilst this will not affect current agricultural uses in most instances, it may restrict certain future land uses for example:

- The erection of buildings and foundations;
- Mineral extraction;
- Planting of deep rooted trees/shrubs; and
- Surfacing the easement or making higher or lower the surface of the land.

7.7.2 There is also the potential for the cables once buried, to reduce the root zone, thus physically restricting root growth immediately above their position; this will be dependent on the crop type, its characteristics and depth of rooting zone. The principal root growth zone is generally accepted to be within the first 500mm of soil from the surface, although dependent on crop, soil type and characteristics and climate. Each cable trench will typically be excavated to a depth of 1.5m in order for the cables to be laid at approximately 1.2m. This will give a minimum distance of 1m between the cables and the surface of the land.

7.7.3 On the basis of the current likely land use practices and land cover, the sensitivity of receptor is considered to be medium (**Table 3.1**).

7.7.4 The maximum area of land subject to these two effects is up to 1.2ha (see **Table 7.4**). These restrictions will be permanent for the operational life of the project. Overall, the magnitude of effect is considered to be low (**Table 3.2**). Mitigation measures are outlined in **Table 7.7**.

Table 7.7 Restrictions on land use practices – mitigation measures

Mitigation measures
• Detailed assessments will be undertaken at the detailed design phase, prior to construction, to inform the design. This will include details of: o Soil type and characteristics; o Types of crops grown; o Depth of field drains; and o Likely depth of root growth zone; and • Discussions with landowners and occupiers regarding potential future land uses and any restrictions on these as part of ongoing discussions

7.7.5 With the implementation of the mitigation measures, the magnitude of the effect will reduce and the residual impact is therefore considered **negligible**.

Two projects - concurrent

7.7.6 As with soil heating, each individual project will contribute equally to this impact; therefore the magnitude of effect is likely to increase when considering both projects in operation together. The area potentially impacted is 2.4ha (**Table**

7.6). The magnitude of effect is medium (**Table 3.2**), thus providing the mitigation measures outlined in **Table 7.7** are implemented, the residual impact is assessed as **minor adverse**.

7.8 Secondary impacts

All scenarios

7.8.1 Secondary impacts represent the impact on agricultural output and earning potential for users of the land. This impact will be associated with the loss of agricultural output and income at the converter stations site.

7.8.2 In the context of the region as a whole this is not considered to represent a major change. The magnitude of effect is low (**Table 3.2**). Given the characteristics of agricultural output discussed in Section 4.6, the sensitivity of receptor is considered to be medium (**Table 3.1**). The overall impact is therefore **negligible**.

7.8.3 The two scenarios will have a minimal effect on the operational impact of the project other than the timing of when the impacts occur. The impact of a single project considered in isolation has been assessed and there are not considered to be any differences in the magnitude of effect or the sensitivity of the receptor compared to both projects operating. Therefore the impact remains **negligible**.

8 Assessment of Impact During Decommissioning

8.1 Potential effects and impacts

8.1.1 This section describes the potential impacts of the decommissioning of the onshore electrical connection with regards to impacts on land use and agriculture. The decommissioning phase is likely to be different for the cable systems and converter stations, and therefore they are considered separately below.

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

8.2 Cable systems

8.2.1 At the time of decommissioning, it will be evaluated whether the buried cable systems could be used for another purpose. If this is not feasible, it will be isolated and left in place unless otherwise specified by the local planning authority.

8.2.2 **Table 8.1** outlines the potential impacts during and following decommissioning. These are similar to those discussed for the operation phase and as such are not discussed further here.

Table 8.1 Summary of impacts during and following decommissioning of the cable system

Potential impact	Sensitivity of receptor	Magnitude of effect	Residual impact
Degradation of soils	High	Medium	**Minor adverse**
Loss of soil resource	High	Medium	**Minor adverse**
Biological contamination	Medium	Medium	**Minor adverse**
Disturbance and nuisance	High	Medium	**Minor adverse**
Impact on land drainage systems	High	Low	**Minor adverse**
Secondary impacts	Medium	Low	**Negligible**

8.3 Converter stations

8.3.1 In relation to the two converter stations, the programme for decommissioning is expected to be similar in duration to the construction phase. The detailed activities and methodology will be determined later within the project lifetime, but are expected to include:

- Dismantling and removal of electrical equipment;
- Removal of cabling from site;
- Removal of any building services equipment;

- Demolition of the buildings and removal of fence;
- Landscaping and reinstatement of the site (including land drainage); and
- Removal of hard standing.

8.3.2 Whilst details regarding the decommissioning of the converter stations are currently unknown, considering the worst case scenario, which would be the removal and reinstatement of the current land use at the site, it is anticipated that the impacts will be similar to the construction phase, and are summarised in **Table 8.2**.

Table 8.2 Summary of residual impacts during and following decommissioning of the converter stations

Potential impact	Sensitivity of receptor	Magnitude of effect	Residual impact
Degradation of soils	High	Medium	**Minor adverse**
Loss of soil resource	High	Medium	**Minor adverse**
Disturbance and nuisance	High	Medium	**Minor adverse**

9 Inter-Relationships

9.1 Inter-relationships

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

9.1.2 **Table 9.1** summarises the inter-relationships that are considered of relevance to land use and agriculture and identifies where they have been considered within the ES.

Table 9.1 Inter-relationships relevant to the assessment of land use and agriculture

Inter-relationship	Section where addressed	Linked Chapter
All Phases		
Influence of socio-economic impacts upon land-use and agriculture.	Section 6.9	**Chapter 22 Socio-economics**
Influence of nature conservation and ecology impacts upon land-use and agriculture.	Section 6.3	**Chapter 25 Terrestrial Ecology**
Influence of access impacts upon land use and agriculture.	Section 6.2	**Chapter 28 Traffic and Access**
Influence of water quality and land quality impacts upon land use and agriculture.	Section 6.4 and 6.6	**Chapter 24 Land Quality and Water Resources**

9.1.3 **Chapter 31 Inter-relationships** provides an overview of all the inter-related impacts associated within the proposed development.

10 Cumulative Impacts

10.1 Introduction

10.1.1 This section describes the Cumulative Impact Assessment for (CIA) land use and agriculture, taking into consideration other plans, projects and activities. A summary of the Cumulative Impact Assessment is presented in **Chapter 33**.

10.1.2 In its simplest form the Cumulative Impact Assessment onshore involves consideration of whether impacts on a receptor can occur on a cumulative basis between the onshore elements of Dogger Bank Teesside A & B and other activities, projects and plans for which sufficient information regarding location and scale exist.

10.1.3 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.

10.2 Screening

10.2.1 The identified projects, activities and plans relevant to land use and agriculture are presented in **Table 10.1** along with a screening exercise to identify whether these are taken forward to the assessment.

Table 10.1 Projects considered within the land use and agriculture Cumulative Impact Assessment

Development Number	Title	Distance to nearest point	Known dates	Potential to result in cumulative land use and agriculture impacts?
1	Tees Renewable Energy Plant	3640 (m)	Expected Operational in 2015	No, given distance from development
2	Tees Renewable Energy Plant underground cable	0 (m) (intersects project)	Expected Operational in 2015	Yes
3	York Potash Project	0 (m) (intersects project)	Application expected in July 2014	Yes
4	Anemometry Mast at The Wilton Centre	30 (m)	Approved February 2011, construction must begin within 3 years	No, given small size of development
5	Northern Gateway Terminal	2680 (m)	Outline permission given in 2007. October 2012 decision: Grant	No, given distance from development

Development Number	Title	Distance to nearest point	Known dates	Potential to result in cumulative land use and agriculture impacts?
			Reserved	
6	Breagh Pipeline	2890 (m)	Approved April 2012, development must begin within 3 years.	No, given distance from development
7	Two storey 2, 3 and 4 bedroom dwelling houses and garages	2320 (m)	Public consultation ends March 2013	No, given small size of development
8	Installation of single pole to house transformer unit (application submitted under section 37 of the electricity act 1989)	3420 (m)	Public consultation end February 2013	No, given small size of development
9	Redevelopment comprising the erection of 288 dwellings and ancillary works (amended scheme)	1920 (m)	Granted planning /permission	No, no change of land use
10	Demolition of various buildings	415 (m)	Granted deemed consent February 2013	No, given small size of development
11	Erection of 6 dwellings	770 (m)	Granted planning permission February 2013	No, given small size of development
12	Teesside Power Station	350 (m)	Permission not required Dec 2012	No, no change of land use
13	Three storey 72 bedroom care home	3300 (m)	Planning permission granted, Mar 2013	No, given distance from development
14	Screening opinion request for new biomass import facility	3140 (m)	EIA not required, Nov 2012	No, given distance from development
15	Screening opinion for proposed potash processing plant	1850 (m)	Insufficient info in planning application, Nov 2012	No, no change of land use
16	Two storey management block with associated 92 space car park	600 (m)	Insufficient info in planning application, Nov 2012	No, no change of land use

Development Number	Title	Distance to nearest point	Known dates	Potential to result in cumulative land use and agriculture impacts?
17	Dogger Bank Teesside C & D	0 (m) (intersects project)	Application expected in 2014	Yes
18	Scoping Request for 2 wind turbines	0 (m) (intersects project)	Currently at Scoping Opinion	Intercepts project, but at very corner of scoping envelope, where the project cable is employing HDD methodology. No additional cumulative impact.
19	Waste Treatment Facility	3160m	Public consultation ended October 2013.	No, given distance from development
20	Extension to Factory	670m	Application Approved	No, no change of land use
21	Teesside Power Plant	200m	Planning permission not required.	No, no change of land use
22	Anaerobic power plant	2435m	Application Approved	No, given distance from development
23	Erection of wind turbine	590m	Application Approved	No, given distance from development
24	Effluent main pipeline	2415m	Application Approved	No, given distance from development
25	Wind Farm	2925m	Public consultation ended November 2013.	No, given distance from development
26	Single Wind Turbine	2160m	Withdrawn	No, given distance from development
27	Changes to house types	2210m	Public consultation ended August 2013	No, given distance from development
28	Four Bungalows	1440m	Application Approved	No, given distance from development
29	1000 dwelling development	1460m	Public consultation ended November 2013	No, given distance from development
30	Erection of agricultural building	0 (m) (intersects project)	Public consultation ended June 2013	Intersects the project, but this area is being HDDed, so no additional cumulative impact.
31	Residential Development	1080m	Application Approved	No, given distance from development

10.2.2 Given the nature of land use and agriculture impacts, only similar projects (large scale buried linear developments) within the same landownership boundaries are likely to result in cumulative impacts. Given this, three projects have been identified with the potential to result in cumulative impacts on land use and agriculture, they are:

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

10.3 Construction

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

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

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

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

Land taken out of existing use

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

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

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

Degradation of soils

10.3.7 As described in paragraph 6.5.1 construction activities associated with each of the projects have potential to result in degradation of soils.

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

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

Impacts on land drainage systems

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

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

Disturbance and nuisance

10.3.12 As well as the direct impacts on land use and agriculture, there is the potential to cause disturbance and nuisance to landowners and occupiers during the construction stage as described in Section 6.9. This will be the physical presence of workers on their land, issues regarding safety and security and the concerns that this may cause. If multiple projects are constructed concurrently the magnitude of these effects will be greater.

Impacts

10.3.13 **Table 10.2** provides an assessment of the cumulative impact associated with a combined construction phase for the impacts described above.

Table 10.2 Potential cumulative construction impacts on land use and agriculture

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

10.3.14 Due to the identification of these additional cumulative impacts on land use and agriculture the mitigation measures in **Table 10.3** have been proposed. This

assumes the cumulative projects identified above will employ similar mitigation measures to those proposed above for Dogger Bank Teesside A & B in addition to those is **Table 10.3**.

Table 10.3 Cumulative impact – mitigation measures

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

10.3.15 Following implementation of these measures the cumulative impact of Dogger Bank Teesside A & B will be no greater than the impact for each individual project with the exception of localised soil degradation. The residual impacts are shown in **Table 10.2**.

10.4 Operation

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

10.5 Decommissioning

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

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

11 Transboundary Effects

11.1 Transboundary effects

11.1.1 No transboundary effects have been identified in relation to land use and agriculture.

12 Summary

12.1 Summary

12.1.1 This chapter of the ES has assessed the potential impact of Dogger Bank Teesside A & B on the baseline land use and agriculture environment in Redcar and Cleveland Borough.

12.1.2 **Table 12.1** provides a summary of the potential impacts on land use and agriculture arising from the realistic worst case scenarios set out in Section 5 of this chapter.

12.1.3 The main impacts in relation to land use and agriculture are associated with the construction phase of Dogger Bank Teesside A & B. However, residual impacts are assessed as **minor adverse** or less. This is due to the temporary nature of the impacts, encountered during construction only. When the cumulative construction impacts of the scheme are considered, the overall residual impacts remain consistent with the exception of soil degradation, when the localised residual impact rises to **moderate adverse**. During operation, the only **minor adverse** residual impacts are for land taken out of existing use at the converter stations site, land drainage and restrictions on land use along the cable route. The impacts during decommissioning will be similar to those during construction and will be subject to a decommissioning plan and associated EIA at the relevant time.

Table 12.1 Summary of predicted impacts of Dogger Bank Teesside A & B on Land Use and Agriculture

Description of Impact	Key Mitigation Measures	Residual Impact (Worst Case Scenario)
Construction		
Land taken out of existing use	• Following the completion of the construction stage the majority of the areas will be reinstated to their former condition and land use. The exception to this is the land at the converter stations site and very small areas associated with jointing pits, both of which are discussed within the operational impacts section. • The construction footprint will be minimised where possible and land reinstated to its former condition as soon as possible following cable installation.	**Minor adverse**
Loss of areas subject to environmental stewardship agreements	• Full and continued consultation with landowners/occupiers will be undertaken, and advice sought during the site planning and construction phase, to ensure that the potential impacts of construction activities upon land in environmental stewardship are minimised, for example through the phasing of works to allow new environmental stewardship sites to be identified before existing stewardship sites are impacted; and • Landowners/occupiers will be compensated for any resultant losses incurred as a direct consequence of the works.	**Negligible** (single project) **Minor adverse** (two projects)
Degradation of soils	• Soils handled, stored and reinstated by a competent contractor under Defra (2009) Construction code of practice for the Sustainable Use of Soils on Construction Sites; • Topsoil will be stripped within all construction areas and stored adjacent to where it is extracted where practical; • The subsoil excavated will be stored separately from the topsoil, with sufficient separation to ensure segregation; • During wet periods, construction methods will be limited where vulnerability to soil compaction is identified; • Heavy plant and vehicles will only be able to use specific routes; • The excavation footprint will be minimised where possible; • In circumstances where construction has resulted in soil compaction, further remediation will be undertaken, through an agreed remediation strategy; • Detailed pre and post soil condition surveys to a minimum depth of 1.5m will be undertaken to allow mitigation measures to be appropriately deigned and to monitor the success of the soil reinstatement, typically surveys would be undertaken for each landowner; • The surveys will also include soil descriptions to be used to identify the soil's susceptibility to damage through the mechanism of compaction; and	**Minor adverse**

Description of Impact	Key Mitigation Measures	Residual Impact (Worst Case Scenario)
	• Detailed method statements will be produced and agreed with the relevant regulator, in advance of the works. Contractors will be required to comply with these.	
Loss of soil resource	• Adherence to the MAFF (2000) Good Practice Guide for Handling Soils and Defra (2009) Construction code of practice for the Sustainable Use of Soils on Construction Sites. These include: o Only working in appropriate weather conditions where soil type dictates; o Appropriate soil storage; o Maintaining effective field drainage systems during construction; o Ensuring reinstatement of individual fields occurs as soon as practical after construction; and o Planting vegetation shortly afterwards. o Soils will be reinstated where possible; o Installation of pre-construction header drains on the uphill side of the working strip; o Post-construction drains installed and stone backfill if required; and o In areas of clay subsoil pre-construction drainage will be installed to maintain existing drainage systems and avoid disruption to the cable installation due to water collecting in the excavated trenches. • If this is not feasible then soils may be re-used on site where a need has been identified within the Site Waste Management Plan, which has been prepared and discusses the disposal options and waste hierarchy in more detail.	**Minor adverse/ Negligible**
Impacts on land drainage systems	• Consultation with landowners and occupiers to establish existing drainage arrangements, location of drains (ideally access to drainage plans where available) and any other information; • Working method statements produced for different drainage systems; • Excavation of soil should only occur in suitable weather conditions, dependent on soil type; • Where necessary the following techniques will be considered: • Post construction, drains will be fully re-instated to their former condition and functioning, where possible; • Minimising the period for which drains are not fully operational; and • Where surface drains and ditches are encountered, and crossed via open-cut installation techniques they will be dammed and a pipe or pump will be installed to ensure water flow is maintained during the cable installation process.	**Minor adverse**
Biological contamination	Defra (2003) has identified a number of best practice measures to minimise the risk of spreading disease. These measures include but are not limited to: • Agreeing access arrangements with landowners/occupiers in advance of any construction works taking	**Negligible**

Description of Impact	Key Mitigation Measures	Residual Impact (Worst Case Scenario)
	place; • Minimising where possible the movements of people, vehicles or equipment into areas where farm animals are kept; and Cleaning equipment upon arrival and departure.	
Disturbance and nuisance	• Continued regular liaison with landowners and occupiers will continue throughout the construction phase to ensure concerns are alleviated as soon as possible; • Tool box talks/ training for construction workers on minimising the impact; and • A protocol for issues to be raised, considered and addressed will be established and distributed to all landowners/occupiers and contractors.	**Minor adverse**
Secondary impacts	• A commitment will be made within the private treaty agreement between the future developers and operators of the development and the landowner/occupier to compensate for crop loss incurred as a direct consequence of the construction phase of the project.	**Negligible**
Operational		
Land taken out of existing use	• Land take will be minimised to the area absolutely required to site the converter stations site and associated landscaping; and • Forewind is actively involved in negotiations with the current landowners to secure the permanent land take, and compensation will form part of those private treaty discussions.	**Minor adverse**
Loss of areas subject to Environmental Stewardship Agreements	• Forewind is actively involved in negotiations with the current landowners to secure the permanent land take, and compensation will form part of those private treaty discussions; and • The landscape screening proposed at the converter stations site will provide limited habitats and thus in comparison to an agricultural field it is likely to contribute marginally towards the substantive objectives of the Environmental Stewardship Agreement.	**Negligible**
Land drainage systems altered	• Following construction, field drainage systems and ditches will be fully reinstated where possible in consultation with landowners/occupiers; • Cable system buried at a depth to allow the continuation of current agricultural practices; • Post-construction monitoring and consultation with landowners/occupiers to ensure reinstatement has been successful; and • In the event of any problems during post-construction monitoring further remediation work will be undertaken.	**Minor adverse**
Soil heating	The following measures are dependent upon the electrical design, geology, soil type and characteristics, method of installation, depth of cable, weather conditions and electrical loading:	**Negligible**

Description of Impact	Key Mitigation Measures	Residual Impact (Worst Case Scenario)
	• Increasing horizontal separation of cables; • Selecting an optimum cable conduction material and diameter; • Undertaking pre-construction soil thermal resistivity surveys; • Changing the properties of the surrounding material (i.e. Importing bedding/ backfill material); and • Increasing the insulation of cables.	
Restrictions on land use practices	• Detailed assessments will be undertaken at the detailed design phase, prior to construction, to inform the design. This will include details of: o Soil type and characteristics; o Types of crops grown; o Depth of field drains; o Likely depth of root growth zone; and o Discussions with landowners regarding potential future land uses and any restrictions on these as part of ongoing discussions.	**Negligible (single project) Minor adverse (two projects)**
Secondary impacts	• Private treaty negotiations with landowners/occupiers will provide a mechanism for the reimbursement of crop loss incurred as a direct impact of the projects during operation.	**Negligible**
Decommissioning		
Impact on land drainage systems	• As per operation phase.	**Minor adverse**
Secondary impacts	• As per operation phase.	**Negligible**
Degradation of soils	• As per construction phase.	**Minor adverse**
Loss of soil resource	• As per construction phase.	**Minor adverse**
Biological contamination	• As per construction phase.	**Minor adverse**
Disturbance and nuisance	• As per construction phase.	**Minor adverse**

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