

Viking CCS Pipeline

**Environmental
Statement Volume II -
Chapter 10: Agriculture
and Soils**

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10 Agriculture and Soils

10.1 Introduction

- 10.1.1 This chapter of the Environmental Statement (ES) presents the assessment of the likely significant effects of the Viking CCS Pipeline (hereafter referred to as the Proposed Development) on agriculture and soils during construction and decommissioning. The assessment includes consideration of impacts to soil resources and agricultural land. As such it considers some aspects of land use but not all. Other land uses such as recreation are considered in *Chapter 16: Socio-economics, ES Volume II (Application Document 6.2.16)* and land as ecological habitat is considered in *Chapter 6: Ecology and Biodiversity, ES Volume II (Application Document 6.2.6)*.
- 10.1.2 Agriculture and soils are interrelated with other environmental effects and so this chapter should be read in conjunction with the following chapters of this *ES Volume II*:
- *Chapter 6: Ecology and Biodiversity;*
 - *Chapter 9: Geology and Hydrogeology;*
 - *Chapter 11: Water Environment;* and
 - *Chapter 16: Socio-economics.*
- 10.1.3 This chapter is supported by Figures 10-1 to 10-3, presented within this chapter (higher resolution versions are included in *ES Volume III, Application Document 6.3*). An Outline Soil Management Plan is presented in *ES Volume IV: Appendix 10.1 (Application Document 6.4.10.1)*.
- 10.1.4 Operational effects have been scoped out of the assessment with the agreement with The Planning Inspectorate (section 10.3).
- 10.1.5 The following definitions are provided as they provide context to the chapter:
- **Agricultural Land Classification (ALC)** is a standardised method for classifying agricultural land according to its versatility, productivity and workability, based upon inter-related parameters including climate, relief, soil characteristics and drainage. The ALC therefore assesses land quality based upon the type and level of agricultural production the land can potentially support. These factors form the basis for classifying agricultural land into one of five grades (with Grade 3 land divided into Subgrades 3a and 3b), ranked from excellent (Grade 1) to very poor (Grade 5). ALC is determined using the Ministry of Agriculture, Fisheries and Food (MAFF) Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land, 1988 (Ref. 10-2);
 - **Best and most versatile (BMV)** agricultural land is defined in the National Planning Policy Framework, 2023 (NPPF) (Ref. 10-3) as land of excellent (ALC Grade 1), very good (Grade 2) and good (Subgrade 3a) agricultural quality. BMV land is afforded a degree of protection against development within planning policy. Moderate, poor and very poor quality land is designated Subgrade 3b or Grades 4 and 5, respectively, and is restricted to a narrower range of agricultural uses;
 - **Soil** is the upper layers of the earth's surface, comprising a mixture of mineral and organic components that contain air, water and micro-organisms. Soils provide a substrate for plant growth, a habitat for animals and storage for water and carbon.

Generally, soils are considered to occur to a maximum depth of 1.2 m, but are often shallower;

- **Soil series** are the lowest category in the soil classification system and are precisely defined based upon particle-size distribution, parent material (substrate) type, colour and mineralogical characteristics; and
- **Soil Associations** (as represented in **Figure 10-3** and discussed within this chapter) are groupings of related soil series.

10.2 Legislation, Policy and Guidance

Introduction

10.2.1 This section describes the legislation, policy and guidance relevant to the assessment of the Proposed Development on agriculture and soils.

Legislation

10.2.2 Regulation 5(2)(c) and Schedule 4 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref. 10-4) requires that the Environmental Impact Assessment (EIA) must identify, describe and assess in an appropriate manner, in light of each individual case, the likely significant direct and indirect effects of the Proposed Development on the environment, including those resulting from *'the use of natural resources, in particular soil, land, water and biodiversity'*.

10.2.3 Whilst it does not apply to the determination of this application, which will be in accordance with the provisions of the Planning Act 2008, Schedule 4, paragraph (y) of The Town and Country Planning (Development Management Procedure) (England) Order 2015 (Ref. 10-5) provides some useful context for assessment of development on agricultural land. That provision requires that where a development is not for agricultural purposes, and is not in accordance with the provisions of a development plan, Natural England must be consulted if:

- the loss of BMV agricultural land (Grades 1, 2 or 3a) exceeds 20 ha and the land is currently (or was last used) for agricultural purposes; or
- the loss of BMV agricultural land (Grades 1, 2 or 3a) is less than 20 ha which is currently (or was last used) for agricultural purposes, but the development is likely to lead to a further loss of BMV land amounting cumulatively to 20 ha or more (for example if it is part of a phased development).

10.2.4 Chapter 1 of The Agriculture Act, November 2020 (Ref. 10-6) 'New Financial Assistance Powers', states at Section 1 that *"the Secretary of State may give financial assistance for, or in connection with, ...protecting or improving the quality of soil"*. Whilst the Act does not provide guidance on how this protection or improvement should be achieved or assessed, this new measure demonstrates the importance placed on soil resources by the current government and shows a commitment to improving the overall baseline condition of UK soils, which potentially has a bearing on the future baseline (paragraph 10.5.89).

National Planning Policy

10.2.5 The government has issued various National Policy Statements (NPS) in relation to energy policy, the need for new infrastructure and guidance for determining an application for a Development Consent Order (DCO). The NPSs include specific criteria and issues which should be covered by applicants in their assessments of the effects of their scheme, and how the decision maker should consider these impacts.

10.2.6 The NPSs relevant to agriculture and soils are detailed in **Table 10-1**.

- 10.2.7 Additionally, the Government is currently reviewing and updating the Energy NPSs. It is doing this in order to reflect its policies and strategic approach for the energy system that is set out in the Energy White Paper (Ref. 10-8) (December 2020), and to ensure that the Planning Policy Framework enables the delivery of the infrastructure required for the country’s transition to net zero carbon emissions. As part of the Energy NPS review process, the Government published a suite of Draft Energy NPSs for consultation on 30 March 2023.
- 10.2.8 The detail of these provisions are however subject to consultation and thereafter implementation. The timetable for adoption of the updated NPSs is not known, however it is anticipated that these may be finalised and shall replace the current NPSs by the time the DCO application is submitted.
- 10.2.9 Given the importance of these NPSs, the EIA approach takes account of these new emerging documents. Where the relevant Draft NPSs contain requirements that differ from the requirements of the NPSs these are indicated in **Table 10-1**, and requirements which remain unchanged are not duplicated. An overview of how relevant national planning policy has been complied with is provided within the *Planning Statement (Application Document 7.1)*.

Table 10-1: National Planning Policy Relevant to Agriculture and Soils

Policy Reference	Policy Context
National Policy Statements	
Overarching National Policy Statement for Energy (EN-1) (Ref. 10-9)	
Section 5 (Paragraph 5.10.8)	<i>“Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5) except where this would be inconsistent with other sustainability considerations. Applicants should also identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination.”</i>
Section 5 (Paragraph 5.10.5)	<i>The [Secretary of State] should ensure that applicants do not site their scheme on the best and most versatile agricultural land without justification. It should give little weight to the loss of poorer quality agricultural land (in grades 3b, 4 and 5), except in areas (such as uplands) where particular agricultural practices may themselves contribute to the quality and character of the environment or the local economy.</i>
Draft Overarching National Policy Statement for Energy (EN-1) (Ref. 10-10) Draft EN-1 retains the requirements of the current document regarding the direction of development towards lower quality land, it has a greater emphasis on soil resources, and adds a requirement to consider soil health, soil management planning, existing land use,	
Section 5 (Paragraph 5.11.4)	<i>“Development of land will affect soil resources, including physical loss of and damage to soil resources, through land contamination and structural damage. Indirect impacts may also arise from changes in the local water regime, organic matter content, soil biodiversity and soil process.”</i>

Policy Reference	Policy Context
Section 5 (Paragraph 5.11.13)	<i>“Applicants should also identify any effects and seek to minimise impacts on soil health and protect and improve soil quality taking into account any mitigation measures proposed”.</i>
Section 5 (Paragraph 5.11.14)	<i>“Applicants are encouraged to develop and implement a Soil Management Plan which could help minimise potential land contamination. The sustainable reuse of soils needs to be carefully considered in line with good practice guidance where large quantities of soils are surplus to requirements or are affected by contamination.”</i>
Section 5 (Paragraph 5.11.23)	<i>“Although in the case of most energy infrastructure there may be little that can be done to mitigate the direct effects of an energy project on the existing use of the proposed site (assuming that some of that use can still be retained post project construction) applicants should nevertheless seek to minimise these effects and the effects on existing or planned uses near the site by the application of good design principles, including the layout of the project and the protection of soils during construction”.</i>
Section 5 (Paragraph 5.11.34)	<i>“The Secretary of State should ensure that applicants do not site their scheme on the best and most versatile agricultural land without justification. Where schemes are to be sited on best and most versatile agricultural land the Secretary of State should take into account the economic and other benefits of that land. Where development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality.”</i>
National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Ref. 10-11)	
Section 1 (Paragraph 1.82)	Although EN-4 only covers nationally significant infrastructure pipelines transporting natural gas or oil, it is considered in this chapter as at paragraph 1.8.2 the document itself states <i>“information in this NPS may be useful in identifying impacts to be considered in applications for pipelines intended to transport other substances”.</i>

Policy Reference	Policy Context
Section 2.23 (Paragraph 2.23.1)	Section 2.23 of EN-4 considers the impacts of gas and oil pipelines on soil and geology. Paragraph 2.23.1 recognises “New pipelines will be installed in a variety of geological conditions. <i>It will be important for applicants to understand the soil types and the nature of the underlying strata... Impacts could include ...loss of soil quality</i> ”.
Section 2.23 (Paragraph 2.23.1)	“ <i>The IPC should take into account the impact on and from geology and soils when considering a pipeline project. A proposal will be acceptable from the point of view of soil and geology if the applicant has proposed a route and other measures (if applicable) that either eliminates any adverse impacts on soil and geology or reduces them to an acceptable level and that the route chosen does not adversely affect the integrity of the pipeline, for example, by increasing materially the risk of fracture or impact on areas of high population</i> ”.
Section 2.23 (Paragraph 2.23.7)	“ <i>Mitigation measures to minimise any adverse effects on soil and geology should include measures to ensure that residual impacts on the surface are minor, for example some differential vegetation growth. Mitigation measures should include appropriate treatment of soil (and in particular topsoil) during site construction and other infrastructure activity (and appropriate soil storage and reinstatement in line with the principles and practices outlined in the Code of Practice for the Sustainable Management of Soils on Construction Sites [(Ref. 10-12)]. The [Secretary of State] should consider what appropriate conditions should be attached to any consent.</i> ”
Section 2.19 (Paragraph 2.19.8)	<i>When designing the route of new pipelines applicants should research relevant constraints.... These can be undertaken by means of desk top studies in the first instance, followed up by consulting the appropriate authority, operator, or conservation body if necessary.</i>
Draft National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Ref. 10-13)	
Section 2.22	The only change to the provisions in the current EN-4, is an addition to the above, stating that mitigation measures should also reference Defra’s Guide to assessing development proposals on agricultural land (Ref. 10-14) which is discussed below. Although the Draft EN-4 contains greater provisions with respect to Carbon Capture Storage (CCS) none of these specifically relate to agriculture and soils.
National Planning Policy Framework (Ref. 10-3)	
Section 15, Paragraph 174	Under Section 15 of the NPPF 2023 (Ref. 10-3): Conserving and enhancing the natural environment, Paragraph 174 states that planning policies and decisions should “ <i>contribute to and enhance the natural and local environment by:</i> <i>a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);</i> <i>b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;</i> ”

Policy Reference	Policy Context
	<p><i>e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and</i></p> <p><i>f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate”.</i></p> <p>The footnote to Paragraph 175 also states that “<i>Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality”.</i></p>
<p>Environmental Improvement Plan for England (EIP) 2023 (Ref. 10-15)</p>	
<p>Goal 6: Using Resources More Sustainably</p>	<p>The Environmental Improvement Plan for England 2023 is the first revision of the 25 Year Environment Plan (Ref. 10-16). It sets out how government will work with landowners, communities and businesses to improve the health of the environment.</p> <p>Goal 6: Improving and protecting soil health, of The Environmental Improvement Plan states that healthy soil will provide natural protection against the impacts of climate change, such as flooding and drought and will increase the diversity of our plants and animals and their ability to thrive. Within The Environmental Improvement Plan, the importance of sustainably managing soil resources is further recognised through the Government’s commitment to bringing at least 40% of England’s agricultural soil into sustainable management by 2028 and increase this to 60% by 2030.</p> <p>This will be delivered through the measures set out in Point 4 of the Delivery Plan for Goal 6, these are:</p> <ul style="list-style-type: none"> • Support farmers and land managers: <i>Defra has introduced the arable and horticultural soils standard and improved grassland soils standard under the Sustainable Farming Incentive. Farmers are being rewarded for actions that protect the soil from erosion, increase soil organic matter, and enable the plants and organisms that live in the soil to function effectively.</i> • Establish comprehensive baseline data: <i>Soil health will be monitored as part of the Natural Capital and Ecosystem Assessment (NCEA). A soil health indicator will be established, and a baseline map of soil health for England will be published by 2028. A methodology and tools to collect consistent information about the health of the soil under all land uses will be developed and guidance and best practice will be shared with farmers and land managers.</i> • Prevent valuable soil resources from being sent to landfill: <i>In 2016, soil made up 58% of material sent to landfill in the UK, a revised Code of Practice for the sustainable use of soil on construction sites to be published in 2023 to reduce this. Additionally, a Soil Re-Use and Storage Depot scheme to help prevent soil that</i>

Policy Reference	Policy Context
	<p>would otherwise be classified as waste going to landfill and encourage remediation and re-use of soil will be piloted by 2026.</p> <ul style="list-style-type: none"> Secure the integrity of future soil carbon codes: Defra will support the development of soil carbon codes and an agricultural soil carbon market. Defra will define the minimum requirements that carbon codes should adhere to ensuring they are underpinned by scientifically robust methodologies to protect buyers and sellers and ensure the integrity of the market.

Local Planning Policies

10.2.10 Local Planning Policies relevant to agriculture and soils is detailed in **Table 10-2**. An overview of how relevant local planning policy has been complied with is provided within the *Planning Statement (Application Document 7.1)*.

Table 10-2: Local Planning Policies Relevant to Agriculture and Soils

Policy Reference	Policy Context
Central Lincolnshire Local Plan (2023) (Ref. 10-17)	
<p>The Proposed Development extends across the administrative areas of Lincolnshire County Council (LCC), North Lincolnshire Council (NLC), North East Lincolnshire Council (NELC), West Lindsey District Council (WLDC) and East Lindsey District Council (ELDC). WLDC forms part of the Central Lincolnshire Joint Strategic Planning Committee (CLJSPC) along with the City of Lincoln and North Kesteven District Councils; as such its planning policy is delivered through the Central Lincolnshire Local Plan which was adopted in April 2023.</p>	
<p>Objective 9: Natural Resources – Land Use and Soils</p>	<p>The Central Lincolnshire Local Plan highlights that outside of the urban areas, land use in Central Lincolnshire is predominantly agricultural, with intensive arable crops dominating and that across Central Lincolnshire soils are mostly fertile and of high quality for agriculture. Objective L of the Plan: Natural Resources – Land Use and Soils, is therefore to “<i>protect and enhance soil and land resources and quality in Central Lincolnshire</i>”.</p>

Policy Reference	Policy Context
<p>Policy S17: Carbon Sinks</p>	<p>No peat soils have been identified within the DCO Site Boundary, however, should they be identified in the course of construction the following section of Policy S17 applies: <i>“For peat soils that are to be removed, the soils must be temporarily stored and then used in a way that will limit carbon loss to the atmosphere”.</i> Noting that all soils on the pipeline route will be temporarily stored and reinstated within the same area they were removed from.</p>
<p>Policy S60: Protecting Biodiversity and Geodiversity</p>	<p>Measures to protect soils are encompassed in the Plan’s geodiversity measures. Part One b) of Policy S60 states that <i>“All development should minimise impacts on biodiversity and features of geodiversity value”.</i> Part Three: Mitigation of Potential Adverse Impacts states <i>“Development should avoid adverse impact on existing biodiversity and geodiversity features as a first principle, in line with the mitigation hierarchy. Where adverse impacts are unavoidable, they must be adequately and proportionately mitigated. If full mitigation cannot be provided, compensation will be required as a last resort where there is no alternative. Development will only be supported where the proposed measures for mitigation and/or compensation along with details of net gain are acceptable to the Local Planning Authority in terms of design and location and are secured for the lifetime of the development with appropriate funding mechanisms that are capable of being secured by condition and/or legal agreement”.</i></p>
<p>Policy S67: Best and Most Versatile Agricultural Land</p>	<p><i>“Proposals should protect the best and most versatile agricultural land so as to protect opportunities for food production and the continuance of the agricultural economy. With the exception of allocated sites, development resulting in the loss of the best and most versatile agricultural land will only be supported if:</i></p> <ul style="list-style-type: none"> <i>a) The need for the proposed development has been clearly established and there is insufficient lower grade land available at that settlement (unless development of such lower grade land would be inconsistent with other sustainability considerations);</i> <i>b) The benefits and/or sustainability considerations outweigh the need to protect such land, when taking into account the economic and other benefits of the best and most versatile agricultural land;</i> <i>c) The impacts of the proposal upon ongoing agricultural operations have been minimised through the use of appropriate design solutions; and</i> <i>d) Where feasible, once any development which is supported has ceased its useful life the land will be restored to its former use (this condition will be secured by planning condition where appropriate).</i> <p><i>Where proposals are for sites of 1 hectare or larger, which would result in the loss of best and most versatile agricultural land, an agricultural land classification report should be submitted, setting out the justification for such a loss and how criterion b has been met.”</i></p>

Policy Reference	Policy Context
East Lindsey Local Plan (2018) (Ref. 10-18)	
Strategic Policy 10 (SP10): Design	<p><i>“The Council will support well-designed sustainable development, which maintains and enhances the character of the District’s towns, villages and countryside by:</i></p> <p><i>1) Where possible supporting the use of brownfield land for development, unless it is of high environmental value, seeking to use areas of poorer quality agricultural land in preference to that of a higher quality”; and</i></p> <p><i>“8) Supporting development that includes measures to recycle, re-use or reduce the demand for finite resources”.</i></p>
Strategic Policy 24 (SP24) - Biodiversity and Geodiversity	<p><i>“1) Development proposals should seek to protect and enhance the biodiversity and geodiversity value of land and buildings and minimise fragmentation and maximise opportunities for connection between natural habitats.</i></p> <p><i>2) The Council will protect sites designated internationally, nationally or locally for their biodiversity and geodiversity importance.... Development, which could adversely affect such a site, will only be permitted in exceptional circumstances...”</i></p>

Guidance

10.2.11 The agriculture and soils assessment has been carried out in accordance with the following:

- *Planning Practice Guidance for the Natural Environment 2019 (PPGNE): Agricultural Land, Soil and Brownfield Land of Environmental Value (Ref. 10-19).* This describes the ALC and advises that it be used to assess the quality of farmland to enable informed choices to be made about its future use within the planning system. The PPGNE also recognises soil as an essential natural capital asset that provides important ecosystem services, for example as a growing medium for food, timber and other crops, as a store for carbon and water, as a reservoir of biodiversity and as a buffer against pollution;
- *Natural England’s Guide to Assessing Development Proposals on Agricultural Land (2021) (Ref. 10-14)* sets out the government policies and legislation that developers and local planning authorities (LPA) should refer to when considering development proposals that affect agricultural land. It also includes guidance on when Natural England should be consulted on development proposals, provides a detailed explanation of ALC and information on published ALC resources and explains circumstances in which new detailed surveys may be required. It also explains how ALC data should be used in the assessment of planning decisions. Importantly, the guidance states that the LPA should ensure that development proposals include plans to protect soils, that where insufficient data are available new surveys should be undertaken to better inform the planning decision, and that these surveys should be carried out by soil scientists or experienced soil specialists. The guidance also summarises the required survey methodology (also presented in Natural England’s 2012 Technical Information Note 049 (TIN049) (Ref. 10-20);
- *Defra’s Construction Code of Practice for the Sustainable Use of Soil on Development Sites (Ref. 10-12)* provides Technical Guidance on the handling, storage and (re)use of soil within construction projects. It is noted that this Guidance is expected to be updated/replaced later in 2023 and therefore the detailed Soil Management Plan (SMP) will refer to the current guidance at that time;

- *The Institute of Quarrying (2021) Good Practice Guide for Handling Soils in Mineral Workings* (Ref. 10-21) details the correct methods for stripping, handling, storage, reinstatement and management of soil resources, including advice on stockpile design. This guidance updates and replaces the Ministry of Agriculture, Fisheries and Food's (MAFF) Good Practice Guide for Handling Soils (2000) and despite originating in the quarrying sector is considered relevant as the advice provided is tailored to schemes where soils are removed and stored for reuse upon completion of development, such as will occur during laying of the pipeline;
- *MAFF's Agricultural Land Classification of England and Wales Revised guidelines and criteria for grading the quality of agricultural land* (Ref. 10-2) provides the current guidelines and criteria for grading the quality of agricultural land in England and Wales;
- *The British Society of Soil Science (BSSS) Guidance Document 3: Working with Soil Guidance Note on Benefitting from Soil Management in Development and Construction (2021)* (Ref. 10-22) provides guidance to development planning and control professionals, site owners and developers aimed at promoting the protection of soils and the important functions they support within the planning system and the development of individual sites;
- *Institute of Environmental Management and Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (2022)* (Ref. 10-23) aims to advocate "a broader approach [to the assessment of soils and agricultural land in EIA] that involves assessing the natural capital and functional ecosystem services provided by land and soils". IEMA consider the guide to be part position paper, part educational resource, and part methodological guidance, resulting in a handbook on the current state of land and soil in EIA.

10.3 Scope of Assessment and Consultation

Introduction

- 10.3.1 A scoping exercise was undertaken in early 2022 to establish the content of the assessment and the approach and methods to be followed.
- 10.3.2 The Scoping Report (*ES Volume IV: Appendix 5.1, Application Document 6.4.5.1*) recorded the findings of the scoping exercise and details the technical guidance, standards, best practice and criteria to be applied in the assessment to identify and evaluate the likely significant effects of the Proposed Development on agriculture and soils.

Scoping Report and Scoping Opinion

- 10.3.3 A summary of stakeholder engagement specific to Agriculture and Soils has been provided in **Table 10-3**.

Table 10-3: Agriculture and Soils Scoping Opinion

Section Reference to Scoping Opinion	Applicant's proposed matter	Planning Inspectorate / prescribed consultee comments	Response
Planning Inspectorate Paragraph 10.7.3	Operational effects on agriculture and soils (including loss of BMV land)	Based on the nature of the Proposed Development, the Inspectorate considers that significant effects on agriculture and soils are unlikely during operation and agrees that the effects of the operational phase on agriculture and soils can be scoped out of the ES.	Operational effects have been scoped out of the ES assessments, in agreement with The Planning Inspectorate.
Lincolnshire County Council	Impact on agricultural land	It is noted that any impact on agricultural land will be temporary in nature and important that there is no long-standing issues to agricultural land - thus supportive of the proposed approach.	It is noted that LCC are supportive of the proposed approach to the assessment of impacts to soils and agricultural land.
Natural England	Loss of Agricultural Land (BMV)	In order to both retain the long-term potential of this land and to safeguard all soil resources as part of the overall sustainability of the whole development, it is important that the soil is able to retain as many of its many important functions and services (ecosystem services) as possible.	The standard practice soil management measures are outlined in the ES (and are further described within the Outline Soil Management Plan (<i>ES Volume IV: Appendix 10.1, Application Document 6.4.10.1</i>) which would retain soil functions and services as far as is practicable.
		The following issues should be considered and included as part of the Environmental Statement (ES):	This has been covered in section 10.7: Potential Impacts and Assessment of Effects of this ES chapter.
		<ul style="list-style-type: none"> The degree to which soils would be disturbed or damaged as part of the development; The extent to which agricultural land would be disturbed or lost as part of this development, including whether any Best and Most Versatile (BMV) agricultural land would be impacted; 	This has been covered in section 10.7: Potential Impacts and Assessment of Effects of this ES chapter.

Section Reference to Scoping Opinion	Applicant's proposed matter	Planning Inspectorate / prescribed consultee comments	Response
		<ul style="list-style-type: none"> The ES should set out details of how any adverse impacts on BMV agricultural land can be minimised through site design/masterplan; and 	<p><i>Chapter 2: Design Evolution and Consideration of Alternatives</i> of this ES details how ALC was considered in the initial options appraisal assessment. Consequently, the Proposed Development's design is such that the majority of above ground infrastructure (permanent development), such as the Immingham Facility and Theddlethorpe Facility (Option 1) is located on non-agricultural land minimising the permanent loss of agricultural land to the development. Therefore, development leading to permanent land loss has been limited to areas associated with the Block Valve Stations and the Theddlethorpe Facility Option 2). Once installed, land above the pipeline will be reinstated to its original land use and quality.</p>
		<ul style="list-style-type: none"> The ES should also set out details of how any adverse impacts on soils can be avoided or minimised and demonstrate how soils will be sustainably used and managed, including consideration in site design and master planning, and areas for green infrastructure or biodiversity net gain. The aim will be to minimise soil handling and maximise the sustainable use and management of the available soil to achieve successful after-uses and minimise offsite impacts. 	<p><i>Chapter 2: Design Evolution and Consideration of Alternatives</i> of this ES details how ALC was considered in the initial options appraisal assessment. Consequently, the Proposed Development's design is such that the majority of above ground infrastructure (permanent development), such as the Immingham Facility and Theddlethorpe Facility (Option 1) is located on non-agricultural land minimising the permanent loss of agricultural land to the development. Therefore, development leading to permanent land loss has been limited to areas associated with the Block Valve Stations and the Theddlethorpe Facility Option 2).</p> <p>Although the pipeline itself is permanent development, the associated disturbance to soils and agricultural land, and removal of land from agricultural use, both from the laying of the pipeline and the formation of construction compounds and accesses etc. is all temporary. All soils and agricultural land are to be reinstated to their original land use and quality following</p>

Section Reference to Scoping Opinion	Applicant's proposed matter	Planning Inspectorate / prescribed consultee comments	Response
			<p>construction - unless reinstatement for biodiversity enhancement is agreed with landowners. The provision of soil management measures is described above. Additional mitigation measures are included in <i>ES Volume IV: Appendix 3.1 (Application Document 6.4.3.1)</i> and in the Outline Soil Management Plan (<i>ES Volume IV: – Appendix 10.1, Application Document 6.4.10.1</i>).</p>
		<p>In order to fully assess the impacts to BMV an Agricultural Land Classification may be necessary. This should normally be at a detailed level, e.g., one auger boring per hectare, (or more detailed for a small site) supported by pits dug in each main soil type to confirm the physical characteristics of the full depth of the soil resource, i.e., 1.2 metres.</p>	<p>A commitment has been made to undertake targeted detailed surveys post-consent, when the Front-End Engineering Design (FEED) is confirmed and hence the areas of disturbance are known. This data will aid in the production of and implementation of the Soil Management Plan, as well as providing baseline land quality data for the success of reinstatement within the pipeline working corridor to be measured against. All surveys would be undertaken to standard Natural England guidelines as summarised in the Scoping Opinion.</p> <p>A desk-based approach to the gathering of baseline soils and ALC data for areas of temporary disturbance is commonly employed in the assessment of linear energy infrastructure projects and local examples of where this methodology has been used include Viking Link (an interconnector from Denmark with 60 km underground cable through Lincolnshire) and Scotland England Green Link 2 (SEGL2) which used published data to establish baseline conditions for the impact assessment. The impact assessment for the export cable corridor NSIP Hornsea Project Four Offshore Wind Farm which is coincident with the Proposed Development in Section 2 (see section 10.10) also follows this desk-based approach.</p>

Section Reference to Scoping Opinion	Applicant's proposed matter	Planning Inspectorate / prescribed consultee comments	Response
	Guidance	Further information is available in the Defra Construction Code of Practice for the Sustainable Use of Soil on Development Sites and The British Society of Soil Science Guidance Note Benefitting from Soil Management in Development and Construction. Further guidance is also set out in the Natural England Guide to assessing development proposals on agricultural land.	This guidance (Ref. 10-9, Ref. 10-11 and Ref. 10-20 respectively) as further described in Section 10.2, has been considered in the assessment along with additional relevant guidance such as that issued by the Institute of Quarrying (Ref. 10-19).

Feedback on the Preliminary Environmental Information Report (PEIR)

10.3.4 A summary of stakeholder engagement and feedback specific to Agriculture and Soils has been provided in **Table 10-4**.

Table 10-4: Agriculture and Soils Feedback

Stakeholder	Date of meeting / communication	Summary of discussions
Natural England	10 February 2023	<p>Natural England notes that the proposal will not likely lead to the loss of 20 ha or more of Best and Most Versatile land.</p> <p>Natural England supports the measures considered in the PEIR section 10.6.7 and recommends these be formally adopted as part of the CEMP to mitigate against the effects on agriculture and soils where required. Natural England note the intention to utilise the DEFRA 2009 Guidance Construction Code of Practice for the Sustainable Use of Soils on Construction Sites which should be abided by. Natural England would like to point out this guidance is currently being reviewed, so recommend that any updated guidance is taken into account should this be released during the pre-submission timeframe.</p> <p><i>Applicant Response:</i> The measures set out in PEIR section 10.6.7 are incorporated into the Outline SMP presented in <i>ES Volume IV: Appendix 10.1 (Application Document 6.4.10.1)</i>. At the time of writing, the DEFRA 2009 Guidance (Ref. 10-12) remains current however any updated guidance will be reflected in the detailed SMP prepared pre-construction.</p>
North Lincolnshire Council	20 January 2023	<p>Having considered Chapter 10 of the PEIR, NLC do not have any objections to the approach set out in the PEIR at this stage. However, it should be noted that NLC does not have expertise in the methods used in this specific study.</p> <p><i>Applicant Response:</i> NLC's comments are noted.</p>
West Lindsey District Council	23 January 2023	<p>The pipeline corridor, so far as it is within the West Lindsey District, lies within an area identified by Natural England as partially being within Grade 3 (Good to Moderate) and Grade 2 (Very Good) agricultural land. As such, WLDC would support soil surveys being undertaken prior to the production of the ES. WLDC are content with the additional mitigation and enhancement measures that are to be included in the Preliminary Draft Construction Environmental Management Plan (CEMP) as detailed within PIER Volume IV Appendix 3.1.</p> <p><i>Applicant Response:</i> To allow spatial flexibility in the final routeing of the pipeline, the DCO Site Boundary</p>

Stakeholder	Date of meeting / communication	Summary of discussions
		<p>is wider than that of the required construction corridor working width (usually 30m). Therefore, a detailed soil and ALC survey of the areas which will be subject to disturbance will be undertaken post-consent once the FEED has commenced and more precise routing confirmed. Data collected will be used to inform the detailed SMP and also provide a baseline ALC against which the restoration outcomes will be measured. Within this chapter of the ES, the ALC grading and division of BMV and non-BMV land is determined by a desk-based approach as set out in Section 10.5. This approach of desk-based assessment followed by detailed survey post-consent is typical for linear infrastructure projects.</p> <p>Relevant mitigation and enhancement measures are incorporated into the Outline SMP, as presented in <i>ES Volume IV: Appendix 10.1 (Application Document 6.4.10.1)</i>.</p>

Additional Consultation

- 10.3.5 No additional consultation has been undertaken with LCC as the Scoping Opinion acknowledged they were supportive of the proposed approach to the assessment.
- 10.3.6 In addition, no extra consultation has been undertaken with NLC as they did not have any objections to the approach set out in the PEIR, nor with WLDC as their response to the PEIR indicated they are content with the mitigation measures proposed.
- 10.3.7 As all points raised by Natural England within the Scoping Opinion and the response to the PEIR have been addressed within this ES, no additional consultation has been undertaken with Natural England.
- 10.3.8 There has been, and will continue to be, ongoing communication between the Proposed Development and landowners throughout the planning process, and beyond (see also *Chapter 4: Consultation* of this ES, and the *Consultation Report (Application Document 5.1)*). The site-specific information gained will assist in defining the routeing and micro-siting of infrastructure; and in describing site specific Embedded Design Measures, if required. For example, the identification of preferred locations for designated crossing points along the pipeline route during construction to minimise disruption to the movement of livestock and machinery; or details of how these works could be programmed to avoid specific locations during sensitive times in the farming calendar (for example during lambing season).

Scope of Assessment

- 10.3.9 The scope of the assessment is to investigate the potential impacts of the Proposed Development on Agricultural Land and Soils.

Aspects scoped into the assessment

- Loss of agricultural land during construction and decommissioning; and
- Loss of soil functions/volumes and soil-related features during construction and decommissioning.

10.3.10 It is noted that the PEIR originally stated that the ES would present separate assessments for 'Soil Resource Quality' and 'Loss of Soil Resources', however these aspects will now be combined into 'Loss of soil functions/volumes and soil-related features' as set out in the recent Institute of Environmental Management and Assessment's (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (Ref. 10-1).

Aspects scoped out of the assessment

10.3.11 As agreed with the Planning Inspectorate during Scoping (see **Table 10-3**) the following aspects have been scoped out of the assessment:

- Loss of agricultural land during operation; and
- Loss of soil functions/volumes and soil-related features during operation.

10.4 Assessment Methodology

Overview

10.4.1 Until February 2022 when the Institute of Environmental Management and Assessment (IEMA) issued their guidance document 'A New Perspective on Land and Soil in Environmental Impact Assessment' (Ref. 10-23) (hereafter referred to as 'the IEMA guidance') there was no published guidance for the consideration of the impacts of development on soils and land in EIA.

10.4.2 As the IEMA guidance was only released shortly before the submission of the Proposed Development's Scoping Report (*ES Volume IV: Appendix 5.1, (Application Document 6.4.5.1)*) the methodology for the assessment of impacts to soils and agricultural land put forward at scoping followed a methodology which had been previously used and accepted on a wide range of projects including linear infrastructure (DCO and Planning Application). This previously accepted methodology was also used for the preliminary assessment presented within the PEIR as practitioners were still determining how the new IEMA guidance should be applied.

10.4.3 The aims of the IEMA guidance are to advocate "*a broader approach [to the assessment of soils and agricultural land in EIA] that involves assessing the natural capital and functional ecosystem services provided by land and soils*". The introduction to the IEMA guidelines states that they are not prescriptive and are designed to be a selective reference document, more in the nature of a land and soil 'handbook'. Soil specialists and EIA practitioners are expected to focus on content relevant to their interests, for example in respect of specific development proposals; and to interpret and apply the guidelines as appropriate to the sensitivity of the environment at the development location, and the nature of the proposed development. Since the PEIR was submitted, AECOM have used the IEMA guidance to develop a methodology suitable for the assessment of the Proposed Development.

10.4.4 The assessment presented in this ES chapter is therefore based upon relevant aspects of the IEMA guidance and focusses on the potential impacts of the Proposed Development to agricultural land and land use including the loss of BMV land, and loss of soil functions/volumes and soil-related features.

Receptor Sensitivity – Agricultural Land

10.4.5 **Table 10-5** identifies the sensitivity criteria that have been used to inform the assessment of effects to agricultural land, these are taken from Table 2 of the IEMA guidance (Ref. 10-23). These are based upon biomass production (considered as the ALC grading of the land, with land of higher grade being more productive and capable of higher biomass yields and therefore classed as being of higher sensitivity); and the degree to which the land supports ecological habitats, soil biodiversity or is a platform for landscape (based upon factors such as whether the land supports designated ecological sites).

Table 10-5: Sensitivity Criteria for Agricultural Land

Sensitivity	Criteria
Very High	<p><i>Biomass Production:</i> Land of ALC Grades 1 and 2.</p> <p><i>Ecological habitat, soil biodiversity and platform for landscape:</i> Soils supporting protected features or designation (e.g., Special area of conservation, Special Protection Area, Ramsar); Peat soils; Soils supporting a National Park or Ancient Woodland.</p>
High	<p><i>Biomass production:</i> Land of ALC Subgrade 3a.</p> <p><i>Ecological habitat, soil biodiversity and platform for landscape:</i> Soils supporting protected features within a UK designated site (e.g., UNESCO Geoparks, Site of Special Scientific Interest (SSSI) or Area of Outstanding Natural Beauty (AONB), Special Landscape Area, and Geological Conservation Review sites); Native Forest and Woodland Soils; Unaltered soils supporting semi-natural vegetation (including UKBAP Priority Habitats).</p>
Medium	<p><i>Biomass production:</i> ALC Subgrade 3b.</p> <p><i>Ecological habitat, soil biodiversity and platform for landscape:</i> Soils supporting protected or valued features within non-statutory designated sites (e.g., Local Nature Reserves (LNR), Local Geological Sites (LGSs), Sites of Nature Conservation Importance (SNCIs), Special Landscape Areas; Non-Native Forest and woodland soils.</p>
Low	<p><i>Biomass production:</i> ALC Grades 4 & 5.</p> <p><i>Ecological habitat, soil biodiversity and platform for landscape:</i> Soils supporting valued features within non designated notable or priority habitats/landscapes. Agricultural soils.</p>
Negligible	As for low sensitivity but with only indirect, tenuous and unproven links between sources of impact and soil functions.

Receptor Sensitivity – Soil Resources

- 10.4.6 As set out in the IEMA guidance (Ref. 10-23), the assessment considers the identified soil resources and their susceptibility to damage when being handled (this is a function of soil type and is related to soil texture and structural development as described below). In accordance with the guidance the sensitivity criteria do not contain a Very High sensitivity rating.
- 10.4.7 Assessing the sensitivity of soil resources to damage (i.e. resistance and resilience of the soil environment, not the importance of the land for agricultural use) is recognised as being complex as soil resources provide a range of functions (ecosystem services), such as supporting plant growth (including food and other crops), water filtration and regulation (role in flood control), nutrient transformation (e.g. role in the nitrogen cycle), carbon storage and sequestration, and supporting biodiversity. The sensitivity criteria for soil resources are therefore based on the susceptibility to damage, both temporarily and permanently when handled.

- 10.4.8 It is recognised within the guidance that some soils are more sensitive to damage when handled during construction than others. The methodology considers soils of high clay content in wetter climate regions to be most sensitive to damage. For example, the incorrect handling/reinstatement of a heavy (clay rich) soil whilst in a plastic state may result in a reinstated soil profile with reduced natural drainage compared to the natural soil profile and a subsequent increased risk of soil loss (erosion) due to surface water run-off. Soils with high sand fraction are considered to be of low sensitivity as the permeable nature of light sandy soils means that the natural structural recovery and drainage potential of these soils is more easily maintained. The Field Capacity Days (FCDs) are also taken into consideration. Field Capacity is the condition in which the soil is saturated with water and any water from rainfall will infiltrate quickly under the force of gravity or create waterlogging.
- 10.4.9 The sensitivity criteria for Soil Resources are set out in **Table 10-6**, which is based upon Table 4 of the IEMA guidance.

Table 10-6: Sensitivity of Soil Resources

Sensitivity	Soil Resources (Texture, Field Capacity Days and Wetness Class)
<p>High (low resilience to structural damage)</p>	<p>Soils with high clay and silt fractions (clays, silty clays, sandy clays, heavy silty clay loams and heavy clay loams) and organo-mineral and peaty soils where the Field Capacity Days (FCD) are 150 or greater.</p> <p>Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams), where the FCDs are 225 or greater.</p> <p>All soils in wetness class V or wetness class VI.</p>
<p>Medium (medium resilience to structural damage)</p>	<p>Clays, silty clays, sandy clays, heavy silty clay loams, heavy clay loams, silty loams and organo-mineral and peaty soils, where the FCDs are fewer than 150.</p> <p>Medium textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams) where FCDs are fewer than 225.</p> <p>Sandy loamy sands, sandy loams and sandy silt loams where the FCDs are 225 or greater or are in wetness classes III and IV.</p>
<p>Low (high resilience to structural damage)</p>	<p>Soils with high sand fraction (sands, loamy sands, sandy loams and sandy silt loams) where the FCDs are fewer than 225 and are in wetness classes I and II.</p>

Magnitude – Agricultural Land

10.4.10 **Table 10-7** identifies the magnitude of impact criteria that have been used to inform the assessment of effects to agricultural land, these are taken from Table 3 of the IEMA guidance (Ref. 10-23). These consider the magnitude (or scale) of change from the baseline conditions currently experienced which could result as a consequence of the Proposed Development; and are based on “*permanent irreversible loss of one or more soil functions or soil volumes (including the permanent sealing or land quality downgrading*” and the area of land affected.

Magnitude – Soil Resources

10.4.11 **Table 10-7** identifies the magnitude of impact criteria that have been used to inform the assessment of effects to soil resources, these are the same criteria as used to assess the magnitude of impact to agricultural land. The criteria consider the magnitude (or scale) of change from the baseline conditions currently experienced which could result as a consequence of Proposed Development; and are based on “*permanent irreversible loss of one or more soil functions or soil volumes (including the permanent sealing or land quality downgrading*”.

10.4.12 Following IEMA guidance (Ref. 10-23), the magnitude of impact upon Soil Resources therefore considers whether the loss of one or more soil functions or soil volumes is permanent (and irreversible), temporary (and reversible), or, whether through adherence to identified mitigation measures, the impact upon soil resources would be negligible, or, if unaffected by development, there would be no change. For consistency across the ES, the terminology however has been standardised in line with *Chapter 5: EIA Methodology, ES Volume II (Application Document 6.2.5)* of this ES. The magnitude of impact is therefore ranked as negligible, low, medium and high as opposed to negligible, minor, moderate and major as quoted in IEMA guidance (Ref. 10-23).

10.4.13 It is noted that the criteria set out in the IEMA guidance (Ref. 10-22) result in any permanent loss of very highly sensitive Grade 1 or Grade 2 agricultural land being classed as significant regardless of the scale of that loss.

Table 10-7: Magnitude of Impact on Agricultural Land and Soil Resources

Magnitude of Impact (Change)	Description of Impacts Restricting Proposed Land Use
High	Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), over an area of more than 20 ha or loss of soil-related features set out in Table 10-5 above, as advised by other topic specialists (such as Ecology, Flood Risk and Socio-economics and Land Use), including effects from ‘temporary developments’; Or Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 20 ha, or gain in soil-related features set out in Table 10-5 above, as advised by other topic specialists (such as Ecology, Flood Risk and Socio-economics and Land Use), including effects from ‘temporary developments’.
Medium	Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), over an area of between 5 and 20 ha or loss of soil-related features set out in Table 10-5 above, as advised by other topic specialists

Magnitude of Impact (Change)	Description of Impacts Restricting Proposed Land Use
	(such as Ecology, Flood Risk and Socio-economics and Land Use), including effects from ‘Temporary Developments’; Or Potential for improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of between 5 and 20 ha, or gain in soil-related features set out in Table 10-5 above, as advised by other topic specialists (such as Ecology, Flood Risk and Socio-economics and Land Use).
Low	Permanent, irreversible loss less than 5 ha or a temporary, reversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), or temporary, reversible loss of soil-related features set out in Table 10-5 above, as advised by other topic specialists (such as Ecology, Flood Risk and Socio-economics and Land Use); Or Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of less than 5 ha or a temporary improvement in one or more soil functions due to remediation or restoration or off-site improvement, or temporary gain in soil-related features, as advised by other topic specialists (such as Ecology, Flood Risk and Socio-economics and Land Use).
Negligible	No discernible loss or reduction or improvement of soil functions or soil volumes that restrict current or proposed land use.
No Change	Unaffected by development within the Study Area / DCO Site Boundary

Significance Criteria – Agricultural Land and Soil Resources

10.4.14 The classification of effects for agricultural land and soil resources has been assessed using **Table 10-8** below which is taken from Table 5 of the IEMA guidance (Ref. 10-23). For consistency across the ES, the terminology however has been standardised in line with *Chapter 5: EIA Methodology* of this ES. The significance of effects is ranked as negligible, minor, moderate, major and very major as opposed to neutral, slight, moderate, large and very large as quoted in the IEMA guidance. Where effects are determined as moderate or major to very major the effect is considered significant. Where effects are determined as negligible, minor or moderate, the effect is considered not significant.

10.4.15 It is noted that the description of effects in **Table 10-8** differs from those set out in the example matrix in *Chapter 5: EIA Methodology* of this ES owing to the larger number of sensitivity and magnitude of impacts categories described in the IEMA guidance (Ref. 10-23).

Table 10-8: Significance of Effects (Agricultural Land and Soil Resources)

		Magnitude of Impact				
		No change	Negligible	Low	Medium	High
Receptor Sensitivity	Very High	No change	Minor	Moderate	Major	Very Major
	High	No change	Minor	Minor	Moderate	Major
	Medium	No change	Negligible	Minor	Moderate	Moderate
	Low	No change	Negligible	Negligible	Minor	Moderate
	Negligible	No change	Negligible	Negligible	Negligible	Minor

Assumptions and Limitations

10.4.16 *Chapter 3: The Description of the Proposed Development, ES Volume II (Application Document 6.2.3)* of this ES, states the duration of construction works at any one location is estimated to be seven months, however any deviation from this programme would not influence the outcomes of the assessment, as the assessment of effects to Agricultural Land and Soils arising during the construction phase is based on guidance which does not require consideration of the duration of the works (impacts). Similarly, if the proposed construction programme were to start later than set out in *Chapter 3: Description of the Proposed Development*, of this ES, this would not influence the outcomes of the assessment.

10.4.17 As noted previously, separate assessments for ‘Soil Resource Quality’ and ‘Loss of Soil Resources’ will no longer be conducted. Instead, in line with the IEMA Guidance (Ref. 10-23), this has been combined into an assessment of ‘Loss of soil functions/volumes and soil-related features’.

10.4.18 As described in *Chapter 3: Description of the Proposed Development*, of this ES, there are two potential locations for the Theddlethorpe Facility, which is required to enable the CO₂ to flow from the new 24” pipeline into the existing Lincolnshire Offshore Gas Gathering System (LOGGS) 36” pipeline. The preferred location would be on non-agricultural land within the former Theddlethorpe Gas Terminal (TGT) (Option 1) and would consequently result in no impacts to soils or agricultural land. The alternative location (Option 2) is on agricultural land to the west of the former terminal site. Option 2 would also require an extension to the current LOGGS 36” pipeline and a new permanent access road. To provide a worst case, the assessment presented in this chapter considers all land within the DCO Site Boundary including the land needed to deliver both Option 1 and Option 2 of the Theddlethorpe Facility.

10.4.19 *Chapter 3: Description of the Proposed Development*, of this ES, states that at decommissioning it is anticipated that the permanent development which has the potential to impact agricultural land at the Block Valve Stations and Theddlethorpe Facility (Option 2) and its associated access track would be removed and the land reinstated to its pre-development condition (ALC grading) and agricultural use. This would represent a long-term reversible loss of agricultural land. However, to present a worst case for the assessment it is assumed that this loss is permanent and irreversible.

- 10.4.20 The most detailed published ALC data covering the whole of the Study Area are the 1:250,000 scale Provisional ALC mapping (Ref. 10-24 and Ref. 10-26). The mapping was published in the period 1967 to 1974. One consequence of the age of the data is that the mapping shows the underlying Ordnance Survey data that was current at the time of issue. Consequently, it does not take account of the extent of development (loss of agricultural land) that has taken place in the intervening period. Therefore, the Provisional ALC mapping has been viewed against current aerial imaging (2019), to allow significant areas of new development (such as the expansion of industry at Immingham) and associated landscape/screening planting to be reassigned as 'urban' or 'non-agricultural'. This provides a more robust baseline for the assessment than directly using the data as originally published.
- 10.4.21 As described in Section 10.3, impacts to soil resources and agricultural land during the operational phase of the Proposed Development have been scoped out of the assessment in agreement with the Planning Authority.
- 10.4.22 The scale and nature of activities undertaken during decommissioning would be similar to those undertaken during construction, and would be temporary, only occurring during the period of decommissioning activities on site. Following the removal of the structures and the reinstatement of the land there would be no further potential effects on agricultural land and soil resources. Therefore, within the assessment the impacts of decommissioning are not assessed separately and are instead regarded as being no greater than those anticipated at construction.
- 10.4.23 The Agricultural and Soils assessment considers the potential effects which the Proposed Development has on agricultural land and soil resources. This includes an assessment of the potential for permanent loss of land and temporary loss of land that might cause disruption to individual occupiers/owners. The assessment does not consider the potential impacts on agricultural or other businesses within. Where landowners/occupiers are directly impacted by the construction phase of the Proposed Development, the Applicant will look to address impacts (e.g., crop loss) through private agreements with the affected parties. Alternatively, the landowners/occupiers may be entitled to compensation in line with the compulsory purchase compensation code.

10.5 Baseline Conditions and Study Area

Study Area

- 10.5.1 The Study Area for the Agriculture and Soils assessment consists of the DCO Site Boundary as defined in *Chapter 3: Description of the Proposed Development* and shown in *Figure 3-8, ES Volume III (Application Document 6.3)*, excluding those areas considered to be marine or intertidal which do not have the potential to contain soils or agricultural land. There is a slight discrepancy in the area coverage of the soil association data and ALC data, the former extending to cover areas of sand dune and other coastal habitat which is not covered by the ALC. The Study Area has therefore been drawn to include the full extent of the soils data available within the DCO Site Boundary, and therefore excludes approximately 1.34 ha of land north of Mablethorpe, which is identified as beach and sea, and for which neither soil association nor ALC data are available. The Study Area therefore covers approximately 613.99 ha as shown in Figure 10-1. A buffer was not applied when describing the Study Area as the impacts to soils and agricultural land only occur on the land that is directly impacted by the Proposed Development.
- 10.5.2 There is approximately 0.61 ha of land to the southern extent of the Study Area (Section 5) for which there are soil association data (shown as Saline 1 association) but no ALC data. Within the ALC calculations this land (which from aerial imaging appears to be sand dune and other coastal habitat) has been recorded as non-agricultural, by reason of it being

excluded from the ALC survey programme used to define the Provisional ALC mapping (Ref. 10-24).

10.5.3 Due to the length of the Proposed Development, the pipeline route has been split along the route based on key road intersections to aid in providing descriptions of the existing baseline (as shown in **Figure 10-1**):

- Section 1 - (Rosper Road, Immingham to A180);
- Section 2 - (A180 to A46);
- Section 3 - (A46 to Pear Tree Lane);
- Section 4 - Pear Tree Lane to B1200 (Manby Middlegate); and
- Section 5 - B1200 (Manby Middlegate) to Theddlethorpe Reception Facility and down to Mean Low Water Springs (MLWS).

10.5.4 The chapter will therefore present data for individual Sections of the Study Area and, where relevant, for the Study Area as a whole.

10.5.5 Additionally, whilst the assessment will be based on a worst case of all land within the DCO Site Boundary being directly impacted by the Proposed Development, in reality, the area defined by the DCO Site Boundary is much larger than the actual area of disturbance (area where impacts to agricultural land and soil resources may occur), which will be confined to the working width (usually a 30 m corridor) plus temporary accesses and construction compounds etc; and the areas of permanent development. This additional area within the DCO Site Boundary is to allow spatial flexibility in the final routeing of the pipeline. Consequently, for information, this ES chapter also shows the likely areas of disturbance based on the preferred pipeline route, which is referred to as the Proposed Working Area. The indicative preferred pipeline route is illustrated on *Figure 3-8, ES Volume III (Application Document 6.3)*.

Data Gathering Methodology

10.5.6 In preparation of this Chapter of the ES, the following sources of published information have been used to establish the baseline conditions:

- Cranfield University LandIS Soils Guide (Ref. 10-25);
- Provisional ALC 1:250,000 mapping of the East Midlands Region (1993) (Ref. 10-24);
- Provisional ALC 1:250,000 mapping of the Yorkshire and the Humber (1993) (Ref. 10-26);
- Aerial Photography from bluesky and from Google Earth;
- Multi-Agency Geographical Information for the Countryside (MAGIC). (Ref. 10-27);
- Likelihood of Best and Most Versatile Agricultural Land Strategic Scale Map – Yorkshire and the Humber (Ref. 10-28);
- Likelihood of Best and Most Versatile Agricultural Land Strategic Scale Map – East Midlands Region (Ref. 10-29);
- Post-1988 survey at Immingham (Ref. 10-30); and
- Met Office Climatological Data for Agricultural Land Classification (Ref. 10-33).

10.5.7 Additionally, National Soil Map of England and Wales (NATMAP) Vector data has been purchased from LandIS. This is the most detailed available soils mapping covering England and Wales and is taken from survey data from the Soil Survey of England and Wales (Ref. 10-31 and Ref. 10-32); it provides digitised soil association data at a 1:250,000 scale.

Sensitive Receptors

10.5.8 The sensitive receptors relevant to the assessment are the soil resources and agricultural land present within the Study Area.

Baseline Conditions

Data Gathering Methodology – Agricultural Land and Land Use

- 10.5.9 The most detailed published ALC data covering the whole of the Study Area are the 1:250,000 scale Provisional ALC mapping (Ref. 10-24 and Ref. 10-26). The scale of the mapping is not accurate at the field level as it generally does not pick up variations in ALC grade for areas less than approximately 80 ha. Additionally, as the mapping was published in the period 1967 to 1974 it is based on survey data collected prior to the issue of the revised guidelines in 1988 (Ref. 10-2). It therefore does not provide a subdivision of Grade 3 land into Subgrade 3a (good quality, BMV) and Subgrade 3b (moderate quality, non-BMV), and the Grade 3 land must therefore be considered as having the potential to be of BMV quality. These data do, however, provide a general indication of the predominant ALC grades within the Study Area and wider Region.
- 10.5.10 There is one detailed published Post-1988 ALC dataset available within the Study Area (Ref. 10-30). These data post-date the revised ALC methodology, and as such provide accurate ALC grading at the field scale including a distinction between ALC Subgrades 3a (BMV) and 3b (non-BMV). As shown on **Figure 10-1**, this is located in Section 1. These data were collected as part of a larger survey totalling 12.2 hectares (ha), carried out by MAFF in December 1994 to inform the Cleethorpes Borough Local Plan. Both Provisional and Post-1988 ALC data are available to view on the Government's geographic information website (Ref. 10-27). Other Post-1988 ALC datasets are available in the wider area, the majority are focussed around the outskirts of Grimsby and Cleethorpes and reflect where surveys have been undertaken in advance of proposed development.
- 10.5.11 To better define the ALC grading of the land within the Study Area, and provide a more robust baseline for the assessment, the subdivision of Subgrade 3a and 3b land has been calculated. As no Post-1988 data containing ALC Grades 1, 2, 4 or 5 is present within the Study Area, Provisional ALC Mapping has been used to directly determine the proportions of ALC Grades 1, 2, 4 and 5. Where there are Post-1988 data available for areas provisionally mapped as Grade 3, these detailed data have been used in preference. For other areas of provisionally mapped Grade 3, the relative proportions of Subgrade 3a and 3b have been calculated using Natural England's Likelihood of Best and Most Versatile (BMV) Agricultural Land mapping (Ref. 10-28 and Ref. 10-29). In a change to the methodology set out in the Scoping Report, as it has not been possible to purchase the Likelihood of BMV dataset in an interrogatable digital format, it has been digitised from the publicly available data set, as shown in **Figure 10-2**.
- 10.5.12 These data spatially map the percentage chance (likelihood) of BMV land occurring within a particular area. The Likelihood of BMV mapping was devised by Natural England (NE) based on soil association data from the 1:250,000 scale national soil map (Soil Survey of England and Wales, 1984 Ref. 10-31 and Ref. 10-32). The methodology assessed each soil association on a regional basis using MAFF's 1988 ALC guidelines (Ref. 10-2). The published ALC data used in the assessment were taken from detailed site surveys, where available, and the Provisional ALC mapping data, as well as climatic data from the Met Office (Ref. 10-33). The method is further described in Defra's 2001 explanatory note (Ref. 10-34).
- 10.5.13 The data provides the likely proportion of BMV agricultural land to be encountered, using the following categories:
- High Likelihood: Areas where more than 60% of the land is likely to be BMV;

- Moderate Likelihood: Areas where 20% to 60% of the land is likely to be BMV; and
- Low Likelihood: Areas where less than 20% of the land is likely to be BMV.

10.5.14 For the purpose of this ES and to provide a robust quantification of the area of BMV land within the Study Area, Grade 3 land mapped as High Likelihood will be considered as Subgrade 3a; whereas land mapped as Moderate Likelihood will be split 50/50 between Subgrades 3a and 3b. The land mapped as Low Likelihood will be considered as Subgrade 3b. The 50:50 split of the Moderate Likelihood data is considered to be suitable as a review of available detailed field scale Post-1988 survey data in the vicinity of the Proposed Development (as shown in **Figure 10-1**), showed the detailed ALC gradings on provisionally mapped Grade 2 and 3 land to be a combination of Grade 2, Subgrade 3a and Subgrade 3b with over 50% being Subgrade 3b. As described above, these survey data are mainly clustered around the fringes of Grimsby and Cleethorpes, with a small area to the north of Louth.

10.5.15 The combination of the areas identified as High Likelihood of BMV and 50% of the areas identified as Moderate Likelihood of BMV land (Ref. 10-28 and Ref. 10-29) (mapped as Grade 3 on the Provisional mapping) and the Provisionally mapped ALC Grade 1 and 2 land, have therefore been used to provide the total potential area of BMV within the Study Area (note the available Post-1988 dataset in Section 1 only shows Subgrade 3b land).

10.5.16 It is noted that the relative proportions of Subgrade 3a and 3b within the Study Area can only be presented in a tabular form and not represented in a mapped format (due to the 50/50 split of the Moderate Likelihood of BMV land). The lack of spatial information does not affect the reporting or impact assessment as this considers the total permanent and temporary reversible loss of BMV land for the Proposed Development as a whole. To provide a worst-case scenario, permanent development resulting in the loss of agricultural land (such as Block Valves and the alternative Theddlethorpe Facility (Option 2)) occurring on provisionally mapped Grade 3 land which is of Moderate Likelihood of BMV is considered as Subgrade 3a (BMV) within the impact assessment.

10.5.17 The desk-based approach to the gathering of baseline soils and ALC data ensures that the baseline is adequately described to ensure that all potentially significant effects are identified and a thorough and robust impact assessment to be undertaken.

10.5.18 A breakdown of the Provisional ALC gradings for the administrative areas of NELC, NLC and LCC is also provided for context.

10.5.19 The current land-use has been informed by the use of aerial and Streetview© imaging provided by Google. The majority of the Study Area has been identified to be in arable production, which corroborates the ALC data presented below, as higher quality (BMV) land is more productive and better suited to arable use than land of lower quality. The arable land is interspersed with permanent pasture and some small to medium woodlands. Therefore, for the purpose of this Chapter, it is assumed that agricultural land use is closely related to agricultural land quality and current land use is therefore reflected in the ALC assessment.

Data Gathering Methodology – Soil Resources

10.5.20 The assessment of impacts to soil resources presented in this chapter is based upon the 1:250,000 scale survey data from the Soil Survey of England and Wales (Ref. 10-31 and Ref. 10-32) which is the most detailed available soils mapping covering England and Wales.

10.5.21 Targeted survey to inform the Detailed SMP will be undertaken post-consent as discussed in Section 10.8.

Baseline ALC and Soils data: Section 1

10.5.22 As shown in **Table 10-9**, 32.09 ha or 46.1 % of land within Section 1 of the Study Area is classified as urban or non-agricultural due to the extent of the current and former industrial facilities within and around Immingham as well as woodland planting. The non-agricultural land includes all land associated with the Immingham Facility that will be subject to permanent development as a consequence of the Proposed Development. The Provisional ALC classifies the remaining 37.56 ha as Grade 3 (Good to Moderate quality). As shown in **Figure 10-1**, Post-1988 survey data (Ref. 10-30), cover part of this Provisional Grade 3 area, classifying approximately 1.37 ha of it as non-BMV, moderate quality Subgrade 3b. These detailed survey data cover part of an agricultural field to the southeast of the Section, within the footprint of the DCO Site Boundary.

10.5.23 The geographical distribution of the Provisional and Post-1988 ALC grading within Section 1 is shown on **Figure 10-1**.

10.5.24 As set out in paragraph 10.5.5, to allow spatial flexibility in the final routing of the pipeline the DCO Site Boundary is much larger than the actual area of disturbance which will occur during construction. Therefore, for information **Table 10-9** also shows the ALC grading within the approximate 30 m corridor centred on the preferred pipeline route - referred to as the Proposed Working Area. The Proposed Working Area in Section 1 totals 15.73 ha, 11.04 ha (70.2 %) of which is agricultural land. The remaining 4.69 ha (29.8 %) of the Proposed Working Area is classified as urban or non-agricultural.

Table 10-9: Summary of Provisional and Post-1988 ALC Grading within Section 1

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.0	0.0	0.0	0.0
Grade 2 (Very Good quality)	0.0	0.0	0.0	0.0
Grade 3 (Good to Moderate quality)	36.18	52.0	10.6	67.4
Subgrade 3b* (Moderate quality)	1.37	2.0	0.44	2.8
Grade 4 (Poor quality)	0.0	0.0	0.0	0.0
Grade 5 (Very Poor quality)	0.0	0.0	0.0	0.0
Non-agricultural / Urban	32.09	46.1	4.69	29.8
TOTAL	69.65	100.00	15.73	100.00
Taken from the Provisional ALC data set for Yorkshire and the Humber (Ref. 10-26) and revised to reflect subsequent changes in the extent of agricultural land due to development. *From the detailed ALC survey (Ref. 10-30)				

10.5.25 As shown in **Table 10-10** the majority (99.8 %) of land within Section 1 mapped as Grade 3 in the Provisional ALC dataset (Ref. 10-26) (as adjusted) is also mapped as High Likelihood of BMV (Ref. 10-28). A small area (0.08 ha) is mapped as Moderate Likelihood of BMV and an area of Subgrade 3b land is also identified in the post-1988 survey data (Ref. 10-30). As

set out in **Table 10-10** the majority of agricultural land in Section 1 (36.14 ha) is classed as Subgrade 3a, BMV. Considering the lower gradings present in available post-1988 survey data in the vicinity, this is likely to be an overestimation, but provides a worst-case scenario in terms of the assessment.

10.5.26 **Table 10-10** shows that Proposed Working Area includes 10.6 ha of Subgrade 3a agricultural land (67.4 % of land within the Proposed Working Area of that Section), again this is likely to be an overestimation.

Table 10-10: Calculated ALC grading for Section 1

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.0	0.0	0.0	0.0
Grade 2 (Very good quality)	0.0	0.0	0.0	0.0
Subgrade 3a (Good quality)	36.14	51.9	10.61	67.4
Subgrade 3b (Moderate quality)	1.42	2.0	0.44	2.8
Grade 4 (Poor quality)	0.0	0.0	0.0	0.0
Grade 5 (Very Poor quality)	0.0	0.0	0.0	0.0
Non-agricultural / Urban	32.09	46.1	4.69	29.8
TOTAL	69.65	100.00	15.73	100.00

10.5.27 The purchased NATMAP Vector data identifies two soil associations within Section 1. These are listed (from north to south in order they are first encountered) within Section 1 in **Table 10-11** and shown in **Figure 10-3**.

10.5.28 The recorded soils are clays and loams and do not fall into Wetness Classes V or IV (Ref. 10-25). Additionally, FCD are fewer than 150 (Ref. 10-33). Therefore, both soils are classed as being of medium sensitivity according to **Table 10-6**.

10.5.29 Both these medium sensitivity soil associations are present within the Proposed Working Area.

Table 10-11: Soil Associations within Section 1

Soil Association	General Description (taken from Ref 10-25)	Area (ha) (and % of Section)	Sensitivity*
Newchurch 2 (814c)	Loamy and clayey soils of coastal flats with naturally high groundwater developed over stoneless clayey marine alluvium. Where control is effective soils are only occasionally waterlogged in winter (Wetness Class II) but elsewhere they are seasonally waterlogged (Wetness Class III)	21.31 (30.60 %)	Medium
Holderness (711u)	Mainly slowly permeable fine loamy and moderately permeable coarse loamy soils on chalky till and glaciofluvial drift. Also includes narrow strips of clayey alluvial	48.33 (69.40 %)	Medium

Soil Association	General Description (taken from Ref 10-25)	Area (ha) (and % of Section)	Sensitivity*
	soils. Slowly permeable and seasonally waterlogged or occasionally waterlogged (Wetness Class III to II).		
TOTAL		69.65 (100 %)	

*As set out in the IEMA guidance (Ref. 10-23) the sensitivity of the soil resource is based upon its texture and drainage characteristics (Ref. 10-25) and the FCD (Ref. 10-33).

Baseline ALC and Soils data: Section 2

10.5.30 As shown in **Table 10-12** the majority of land within Section 2 of the Study Area (approximately 68.62 ha, 68.6%) is classed as Grade 3 on the Provisional mapping. The remaining land is classed as Grade 2 and is identified to the southern tip of the Section extending southwards into Section 3, to the west of Laceby. It is noted that detailed post-1988 survey of provisional Grade 2 land around Laceby showed the land to be a mix of Grade 2 and Subgrades 3a and 3b land.

10.5.31 The geographical distribution of the Provisional ALC grading within the Section 2 is shown on **Figure 10-1**.

10.5.32 Data for the Proposed Working Area are presented for information. Within Section 2 the Proposed Working Area covers 29.59 ha, comprising 9.02 ha of Grade 2 and 20.57 ha of Grade 3 land.

Table 10-12: Summary of Provisional ALC Grading within Section 2

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.0	0.0	0.0	0.0
Grade 2 (Very Good quality)	31.34	31.4	9.02	30.5
Grade 3 (Good to Moderate quality)	68.62	68.6	20.57	69.5
Grade 4 (Poor quality)	0.0	0.0	0.0	0.0
Grade 5 (Very Poor quality)	0.0	0.0	0.0	0.0
Non-agricultural / Urban	0.0	0.0	0.0	0.0
TOTAL	99.96	100.00	29.59	100.00

Taken from the Provisional ALC data set for Yorkshire and the Humber (Ref. 10-26) and the East Midlands Region (Ref. 10-24) and revised to reflect subsequent changes in the extent of agricultural land due to development.

10.5.33 As shown on **Figure 10-2** all land within Section 2 mapped as Grade 3 on the Provisional mapping is also mapped as High Likelihood of BMV. Therefore, all Grade 3 land has been classified as Subgrade 3a (BMV).

10.5.34 All land within Section 2 is therefore considered to be of BMV quality (Grade 2 and Subgrade 3a). However, considering the lower gradings present in available post-1988 survey data in

the vicinity (**Figure 10-1**) this is likely to be an overestimation but provides a worst-case scenario in terms of the assessment.

10.5.35 Data for the Proposed Working Area are presented for information. Within Section 2 the Proposed Working Area covers 29.59 ha all of which is considered to be of BMV quality (Grade 2 and Subgrade 3a). However, as explained in the paragraph above this is likely to be an overestimation.

Table 10-13: Calculated ALC grading for Section 2

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.0	0.0	0.0	0.0
Grade 2 (Very good quality)	31.34	31.4	9.02	30.5
Subgrade 3a (Good quality)	68.62	68.6	20.57	69.5
Subgrade 3b (Moderate quality)	0.0	0.0	0.0	0.0
Grade 4 (Poor quality)	0.0	0.0	0.0	0.0
Grade 5 (Very Poor quality)	0.0	0.0	0.0	0.0
Non-agricultural / Urban	0.0	0.0	0.0	0.0
TOTAL	99.96	100.00	29.59	100.00

10.5.36 The purchased NATMAP Vector data identifies five soil associations within Section 2. These are listed (from north to south in order they are first encountered) and shown in **Table 10-14**.

10.5.37 Four of the five recorded soils are loams and do not fall into Wetness Classes V or IV (Ref. 10-25). Additionally, FCD are fewer than 150 (Ref. 10-33). Therefore, these soils are classed as being of medium sensitivity according to **Table 10-6**. Due to the sandy texture of the Newmarket 1 association and it being classed as Wetness Class I, these soils are considered to be of low sensitivity.

10.5.38 All the soil associations identified in the DCO Site Boundary are also present within the Proposed Working Area, with soils of the Holderness association remaining dominant.

Table 10-14: Soil Associations within Section 2

Soil Association	General Description (taken from Ref 10-25)	Area (ha) (and % of Section)	Sensitivity*
Holderness (711u)	Mainly slowly permeable fine loamy and moderately permeable coarse loamy soils on chalky till and glaciofluvial drift. Also includes narrow strips of clayey alluvial soils. Slowly permeable and seasonally waterlogged or occasionally waterlogged (Wetness Class III to II).	63.13 (63.16 %)	Medium
Burlingham 2 (572o)	Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging (Wetness Classes II or III). Some slowly permeable seasonally waterlogged fine loamy soils. Some well	13.37 (13.27 %)	Medium

Soil Association	General Description (taken from Ref 10-25)	Area (ha) (and % of Section)	Sensitivity*
	drained fine and coarse loamy soils. Developed over chalky till.		
Landbeach (512b)	Permeable calcareous coarse loamy soils affected by groundwater over glaciofluvial sand and chalky gravel. Some deep, in part non-calcareous fine and coarse loamy soils affected by groundwater. The soils are permeable and either well drained or only occasionally waterlogged (Wetness Classes I or II).	13.94 (13.95 %)	Medium
Swaffham Prior (511e)	Well drained calcareous coarse and fine loamy soils over chalk rubble. Some similar shallow soils. Deep non-calcareous loamy soils in places. (Wetness Class I) Striped and polygonal soil patterns locally. Slight risk of water erosion.	7.79 (7.79 %)	Medium
Newmarket 1 (343f)	Shallow well drained calcareous sandy and coarse loamy soils over chalk or chalk rubble. Some similar deeper sandy soils, often in an intricate striped pattern. Well-drained (Wetness Class I).	1.69 (1.69 %)	Low
Waterbody		0.04 (0.04%)	
TOTAL		99.96 (100 %)	
*As set out in the IEMA guidance (Ref. 10-23) the sensitivity of the soil resource is based upon its texture and drainage characteristics (Ref. 10-25) and the FCD (Ref. 10-33).			

Baseline ALC and Soils data: Section 3

- 10.5.39 As shown in **Table 10-15** the majority of land within Section 3 (approximately 142.59 ha, 75.9 %) is classed as Grade 3 in the Provisional mapping. Grade 2 land is identified to the north of the Section extending northwards into Section 2, within and along the western boundary of the Lincolnshire Wolds AONB to the east of Irby upon Humber.
- 10.5.40 The geographical distribution of the Provisional ALC grading within the Section 3 is shown on **Figure 10 1**.
- 10.5.41 Data for the Proposed Working Area are presented for information. Within Section 3 the Proposed Working Area covers 54.39 ha, comprising 12.27 ha of Grade 2 and 42.12 ha of Grade 3 land.

Table 10-15: Summary of Provisional ALC Grading within Section 3

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.0	0.0	0.0	0.0
Grade 2 (Very Good quality)	45.20	24.1	12.27	22.6
Grade 3 (Good to Moderate quality)	142.59	75.9	42.12	77.4
Grade 4 (Poor quality)	0.0	0.0	0.0	0.0
Grade 5 (Very Poor quality)	0.0	0.0	0.0	0.0
Non-agricultural / Urban	0.00	0.0	0.0	0.0
TOTAL	187.79	100.0	54.39	100.0

Taken from the Provisional ALC data set for Yorkshire and the Humber (Ref. 10-26) and the East Midlands Region (Ref. 10-24)

10.5.42 As shown on **Figure 10-2**, the Provisional Grade 3 land within Section 3 is mapped as a combination of High (114.85 ha) and Moderate (27.74 ha) Likelihood of BMV. The Moderate Likelihood land occurs in the approximate area where the Study Area runs parallel with the A18. The Grade 3 land has therefore been classified as Subgrade 3a (BMV) and Subgrade 3b, as set out in **Table 10-16**. The majority of land in Section 3 (173.92 ha, 92.61 %) is therefore classed as BMV, comprising Grade 2 and Subgrade 3a.

10.5.43 Data for the Proposed Working Area are presented for information. Within Section 3 the Proposed Working Area covers 54.39 ha, of which 50.23 ha (92.3 %) is considered to be of BMV quality (Grade 2 and Subgrade 3a).

Table 10-16: Calculated ALC grading for Section 3

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.0	0.0	0.0	0.0
Grade 2 (Very good quality)	45.20	24.1	12.27	22.6
Subgrade 3a (Good quality)	128.72	68.5	37.96	69.8
Subgrade 3b (Moderate quality)	13.87	7.4	4.16	7.7
Grade 4 (Poor quality)	0.0	0.0	0.0	0.0
Grade 5 (Very Poor quality)	0.0	0.0	0.0	0.0
Non-agricultural / Urban	0.0	0.0	0.0	0.0
TOTAL	187.79	100.0	54.39	100

10.5.44 The purchased NATMAP Vector data identifies four soil associations within Section 3. These are listed (from north to south in order they are first encountered) in **Table 10-17** and shown in **Figure 10-3**.

10.5.45 Three of the four recorded soils are loamy soils which do not fall into Wetness Classes V or IV even when undrained (Ref. 10-25). Additionally, FCD are fewer than 150 (Ref. 10-33). Therefore, these soils are classed as being of medium sensitivity according to **Table 10-6**. The Salop association comprises loamy clayey soils, but is classed as Wetness Class IV when undrained. As the drainage status of the land within the DCO Site Boundary cannot be confirmed at this time, a Wetness Class of IV must be assumed as a worst case resulting in these soils being classed as being of high sensitivity according to **Table 10-6**.

10.5.46 All the soil associations identified in the DCO Site Boundary (**Table 10-17**) are also present within the Proposed Working Area, with soils of the Holderness association remaining dominant (35.76 ha, 65.7 % of the Proposed Working Area). The highly sensitive Salop association could not be avoided and makes up 8.8 ha (16.2 %) of the Proposed Working Area.

Table 10-17: Soil Associations within Section 3

Soil Association	General Description (taken from Ref 10-25)	Area (ha) (and % of Section)	Sensitivity*
Burlingham 2 (572o)	Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging (Wetness Classes II or III). Some slowly permeable seasonally waterlogged fine loamy soils. Some well drained fine and coarse loamy soils. Developed over chalky till.	32.67 (17.40 %)	Medium
Holderness (711u)	Mainly slowly permeable fine loamy and moderately permeable coarse loamy soils on chalky till and glaciofluvial drift. Also includes narrow strips of clayey alluvial soils. Slowly permeable and seasonally	124.54 (66.32%)	Medium

Soil Association	General Description (taken from Ref 10-25)	Area (ha) (and % of Section)	Sensitivity*
	waterlogged or occasionally waterlogged (Wetness Class III to II).		
Arrow (543)	Developed in glaciofluvial and river terrace deposits, this association is composed predominantly of coarse loamy soils. Because of the variable nature of the underlying drift and differences in soil water regime, local variation in component soil series occurs. The soils are permeable but are seasonally waterlogged on undrained land (Wetness Class II and III), but mostly respond well to drainage measures after which they are usually well drained (Wetness Class I).	1.27 (0.68 %)	Medium
Salop (711m)	Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils associated with fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging. Most of the soils when undrained are waterlogged for long periods in winter (Wetness Class IV). Surface waterlogging results from the combination of slowly permeable subsoil and slow surface run-off from relatively flat land. The soils can be improved to Wetness Class III with underdrainage.	29.31 (15.61 %)	High
TOTAL		187.79 (100 %)	
*As set out in the IEMA guidance (Ref. 10-23) the sensitivity of the soil resource is based upon its texture and drainage characteristics (Ref. 10-25) and the FCD (Ref. 10-33).			

Baseline ALC and Soils Data: Section 4

10.5.47 All land within Section 4 (approximately 148.10 ha) is provisionally mapped as Grade 3 (Ref. 10-24) and therefore no table is included to summarise Provisional ALC grading within the section. The geographical distribution of ALC grading within Section 4 is shown on **Figure 10-1**.

10.5.48 As shown on **Figure 10-2** the Provisionally mapped Grade 3 land within Section 4 is mapped as a combination of High (143.37 ha) and Moderate (4.73 ha) Likelihood of BMV. The Moderate Likelihood land occurs as a small sliver alongside the Louth Canal. The majority of the land within Section 4 (98.4 %) is therefore classed as Subgrade 3a (BMV), as set out in **Table 10-18**.

10.5.49 Data for the Proposed Working Area are presented for information. Within Section 4 the Proposed Working Area covers 41.59 ha, with the majority (41.23 ha, 99.1 %) comprising Subgrade 3a (BMV) land.

Table 10-18: Calculated ALC Grading for Section 4

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.0	0.0	0.0	0.0
Grade 2 (Very Good quality)	0.0	0.0	0.0	0.0
Subgrade 3a (Good quality)	145.74	98.4	41.23	99.1
Subgrade 3b (Moderate quality)	2.36	1.6	0.37	0.9
Grade 4 (Poor quality)	0.0	0.0	0.0	0.0
Grade 5 (Very Poor quality)	0.0	0.0	0.0	0.0
Non-agricultural / Urban	0.0	0.0	0.0	0.0
TOTAL	148.10	100.0	41.59	100.0

10.5.50 The purchased NATMAP Vector data identifies three soil associations within Section 4. These are listed (from north to south in order they are first encountered) in **Table 10-19** and shown in **Figure 10-3**. Almost all the soils in this Section (95.95%) are listed as the Holderness Association.

10.5.51 The three recorded soils are loamy and clayey soils which do not fall into Wetness Classes V or IV even when undrained (Ref. 10-25). Additionally, FCD are fewer than 150 (Ref. 10-33). Therefore, these soils are classed as being of medium sensitivity according to **Table 10-6**.

10.5.52 All the soil associations identified in the DCO Site Boundary (**Table 10-19**) are also present within the Proposed Working Area, with soils of the Holderness association remaining dominant (40.27 ha, 96.8 % of the Proposed Working Area).

Table 10-19: Soil Associations within Section 4

Soil Association	General Description (taken from Ref 10-25)	Area (ha) (and % of Section)	Sensitivity*
Holderness (711u)	Mainly slowly permeable fine loamy and moderately permeable coarse loamy soils on chalky till and glaciofluvial drift. Also includes narrow strips of clayey alluvial soils. Slowly permeable and seasonally waterlogged or occasionally waterlogged (Wetness Class III to II).	142.10 (95.95 %)	Medium
Newchurch 2 (814c)	Loamy and clayey soils of coastal flats with naturally high groundwater developed over stoneless clayey marine alluvium. Where control is effective soils are only occasionally waterlogged in winter (Wetness Class II) but elsewhere they are seasonally waterlogged (Wetness Class III)	2.72 (1.84%)	Medium
Wallasea 2 (813g)	Deep stoneless clayey soils developed over reclaimed marine alluvium.	3.28 (2.22 %)	Medium

Soil Association	General Description (taken from Ref 10-25)	Area (ha) (and % of Section)	Sensitivity*
	Calcareous in places. Some deep calcareous silty soils. (Wetness Class I to II).		
TOTAL		148.10 (100 %)	

*As set out in the IEMA guidance (Ref. 10-23) the sensitivity of the soil resource is based upon its texture and drainage characteristics (Ref. 10-25) and the FCD (Ref. 10-33).

Baseline ALC and Soils data: Section 5

10.5.53 As shown in **Table 10-20**, all agricultural land within Section 5 (approximately 97.00 ha, 89.41 % of all land within the Section and 27.9 ha, 97.6 % of land within the Proposed Working Area for the Section) is Provisionally classed as Grade 3. The remaining land is classed as non-agricultural or urban and is mainly associated with the former TGT, other non-agricultural or urban land comprises areas of dune habitat and existing roads. It is noted that depending upon the location of the Theddlethorpe facility (within the former TGT (Option 1) or on adjacent agricultural land (Option 2)), its construction may or may not result in the permanent loss of agricultural land.

10.5.54 The geographical distribution of the Provisional ALC grading within the Section 5 is shown on **Figure 10-1**.

Table 10-20: Summary of Provisional ALC Grading within Section 5

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.00	0.00	0.00	0.00
Grade 2 (Very Good quality)	0.00	0.00	0.00	0.00
Grade 3 (Good to Moderate quality)	97.00	89.41	27.9	97.6
Grade 4 (Poor quality)	0.00	0.00	0.00	0.00
Grade 5 (Very Poor quality)	0.00	0.00	0.00	0.00
Non-agricultural / Urban	11.49	10.59	0.69	2.42
TOTAL	108.49	100.00	28.64	100.00

Taken from the Provisional ALC data set for the East Midlands Region (Ref. 10-24)

10.5.55 As shown on **Figure 10-2** the Provisionally mapped Grade 3 land within Section 5 is mapped as a combination of High (90.35 ha) and Low (1.25 ha) Likelihood of BMV. The Low Likelihood land occurs as a small section between the eastern boundary of the former TGT and the coast and is classed as Subgrade 3b. The majority of the Grade 3 land in this Section is mapped as High Likelihood and therefore classed as Subgrade 3a (BMV), as set out in **Table 10-21**. The Likelihood mapping also identifies further areas of urban/agricultural land (5.41 ha).

10.5.56 Data for the Proposed Working Area are presented for information. Within Section 5 the Proposed Working Area avoids the land identified as being of Low Likelihood of BMV. Consequently all 27.09 ha of agricultural land is classed as Subgrade 3a (BMV).

Table 10-21: Calculated ALC grading for Section 5

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.0	0.0	0.0	0.0
Grade 2 (Very Good quality)	0.0	0.0	0.0	0.0
Subgrade 3a (Good quality)	90.35	83.3	27.09	94.6
Subgrade 3b (Moderate quality)	1.25	1.2	0.0	0.0
Grade 4 (Poor quality)	0.0	0.0	0.0	0.0
Grade 5 (Very Poor quality)	0.0	0.0	0.0	0.0
Non-agricultural / Urban	16.89	15.6	1.55	5.4
TOTAL	108.49	100.0	28.64	100.0

10.5.57 It is also noted that to the south of Section 5 the agricultural land also supports the European designated Sites of Saltfleetby-Theddlethorpe Dunes & Gibraltar Point Special Area of Conservation (SAC), the Humber Estuary Special Protection Area (SPA) and Ramsar site. Therefore, according to the criteria in **Table 10-5** this land (approximately 0.64 ha) must be considered as being of Very High sensitivity. However, as these designations occur beyond the Dune Isolation Valve (i.e., they occur in an area where existing infrastructure will be utilised and no upgrading or replacement of infrastructure is required) no direct effects to this land is anticipated.

10.5.58 The purchased NATMAP Vector data identifies four soil associations within Section 5. These are listed (from north to south in order they are first encountered) in **Table 10-18** and shown in **Figure 10-3**.

10.5.59 The Wallasea 2 association is dominant within Section 5. This association and the Holderness association are loamy and/or clayey soils which do not fall into Wetness Classes V or IV (Ref. 10-25). Additionally, FCD are fewer than 150 (Ref. 10-33). Therefore, these soils are classed as being of medium sensitivity according to **Table 10-6**. Due to their sandy texture, soils of the Sandwich and Saline 1 associations are considered to be of low sensitivity (**Table 10-6**).

10.5.60 The works at the Dune Isolation Valve are located on land identified as the Wallasea 2 association.

10.5.61 The low sensitivity soils of the Sandwich and Saline 1 associations are not present within the Proposed Working Area as these occur over the existing LOGGS pipeline where no intrusive works are proposed. Soils of the Wallasea 2 association are dominant covering 95.4 % of the Proposed Working Area.

Table 10-22: Soil Associations within Section 5

Soil Association	General Description (taken from Ref 10-25)	Area (ha) (and % of Section)	Sensitivity*
Holderness (711u)	Mainly slowly permeable fine loamy and moderately permeable coarse loamy soils on chalky till and glaciofluvial drift. Also includes narrow strips of clayey alluvial soils. Slowly permeable and seasonally waterlogged or occasionally waterlogged (Wetness Class III to II).	4.50 (4.15 %)	Medium
Wallasea 2 (813g)	Deep stoneless clayey soils developed over reclaimed marine alluvium. Calcareous in places. Some deep calcareous silty soils. (Wetness Class I to II).	102.50 (94.48 %)	Medium
Sandwich (361)	Mainly deep well drained calcareous and non-calcareous sandy soils supporting sand dune and some wetland habitats. Very limited agriculture and coniferous woodland use as the soils are droughty, and unstable when ploughed. Some sparsely vegetated unstable soils. Waterlogged soils in hollows locally. Shingle bars and spits locally extensive.	0.55 (0.50 %)	Low
Saline 1 (0220)	Soils of variable texture flooded by high tides developed over marine alluvium. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.	0.94 (0.87 %)	Low
TOTAL		148.10 (100 %)	
*As set out in the IEMA guidance (Ref. 10-23) the sensitivity of the soil resource is based upon its texture and drainage characteristics (Ref. 10-25) and the FCD (Ref. 10-33).			

Provisional and Post-1988 ALC in the Study Area

10.5.62 As shown in **Table 10-23** the Provisional and Post-1988 ALC data show over three quarters of the land within the Study Area (approximately 493.87 ha, 80.4 %) as Grade 3/Subgrade 3b agricultural land. As shown in **Figure 10-1**, 1.37 ha of Subgrade 3b (non-BMV) land was identified through post-1988 survey data (Ref. 10-30). These detailed survey data cover part of an agricultural field to the southeast of Section 1 through which the pipeline is envisaged to be routed.

10.5.63 Grade 2 land comprises 76.54 ha (approximately 12.5 %) of the Study Area and is found on the junction of Sections 2 and 3 in and around the Lincolnshire Wolds AONB near Riby, Laceby and Irby upon Humber (**Figure 10-1**).

10.5.64 Urban and non-agricultural land covers approximately 43.58 ha of the Study Area (7.1%) and is located to the north and south of the Study Area associated with the current and former industrial facilities within and around Immingham and the former TGT. Areas of

permanent above ground development associated with the Pipeline Immingham Facility and preferred location for the Theddlethorpe Facility (Option 1) will be located within this urban and non-agricultural land. However, if Theddlethorpe Facility Option 2 is selected, some loss of agricultural land will occur.

10.5.65 The geographical distribution of the Provisional and Post-1988 ALC grading within the Study Area is shown on **Figure 10-1**.

10.5.66 Data for the Proposed Working Area are presented for information. **Table 10-23** demonstrates that although the Study Area used for the impact assessment (comprising all mapped soils within the DCO Site Boundary) covers 613.99 ha, the Proposed Working Area covers just over a quarter (27.7 %) of this, totalling 169.95 ha. The percentage of urban and non-agricultural land within the Proposed Working Area is less than half of that for the Study Area (3.2 % compared to 7.1 %) mainly owing to the routing through the industrial area at Immingham (Section 1).

Table 10-23: Summary of Provisional and Post-1988 ALC Grading within the Study Area

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.0	0.0	0.0	0.0
Grade 2 (Very Good quality)	76.54	12.5	21.29	12.5
Grade 3 (Good to Moderate quality)	492.49	80.2	142.84	84.0
*Subgrade 3b (Moderate quality)	1.37	0.2	0.44	0.3
Grade 4 (Poor quality)	0.0	0.0	0.0	0.0
Grade 5 (Very Poor quality)	0.0	0.0	0.0	0.0
Non-agricultural / Urban	43.58	7.1	5.38	3.2
TOTAL	613.99	100.00	169.95	100.0
Taken from the Provisional ALC data set for Yorkshire and the Humber (Ref. 10-26) and revised to reflect subsequent changes in the extent of agricultural land due to development. *From the detailed ALC survey (Ref. 10-30)				

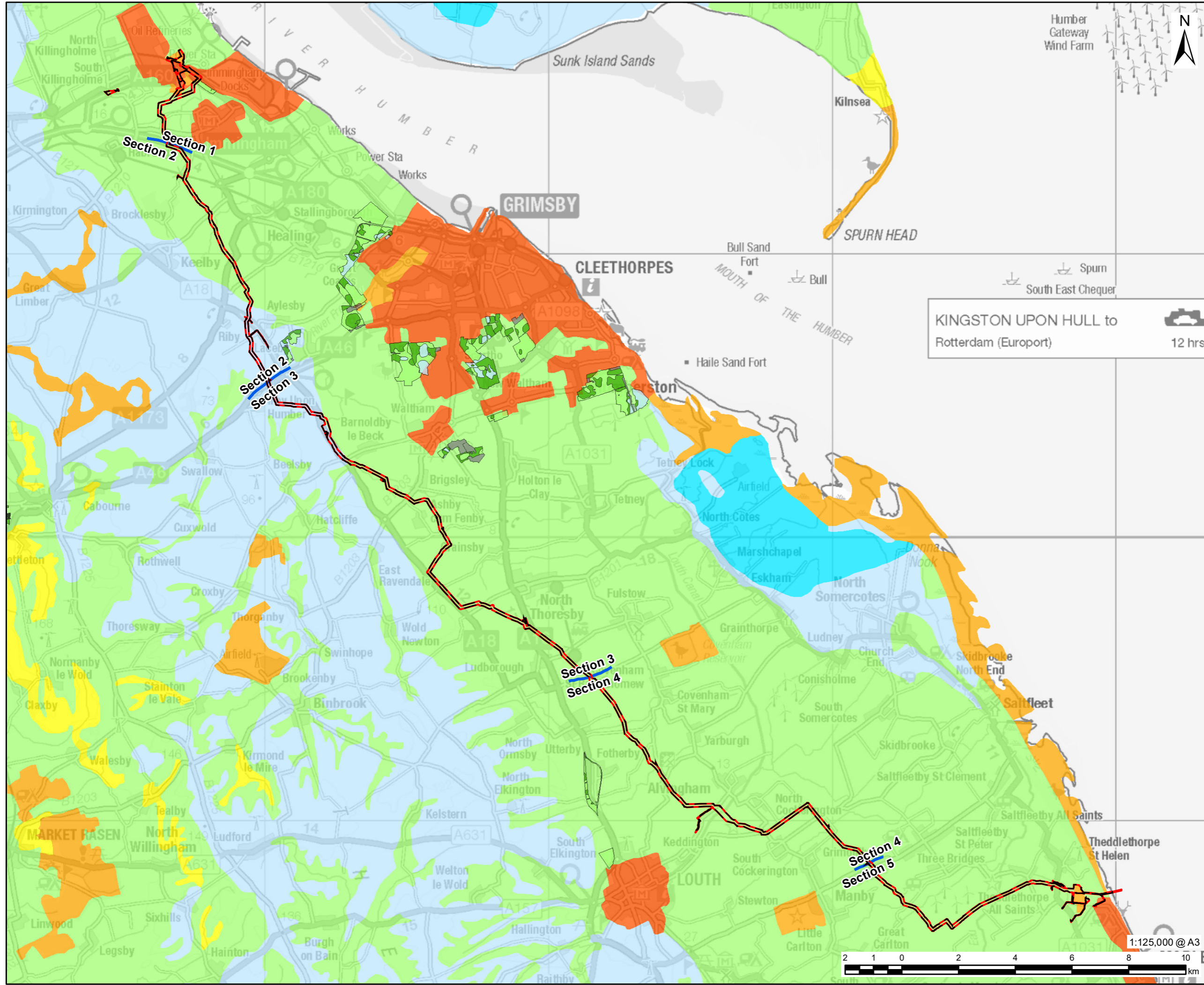
10.5.67 As shown on **Figure 10-2** the majority of land within the Study Area shown as Grade 3 on the Provisional ALC mapping coincides with areas mapped as High Likelihood of BMV. Discrete areas of Moderate and Low Likelihood land also occur as described for the individual Sections, above. The majority of the Grade 3 land within the Study Area is therefore classed as Subgrade 3a, and 88.9 % (546.11 ha) of land within the Study Area is calculated as being of BMV quality (Grade 2 and Subgrade 3a), as set out in **Table 10-24**. The data include the post-1988 data (Ref. 10-30).

10.5.68 Data for the Proposed Working Area are presented for information. The majority of the Grade 3 land within the Proposed Working Area is classed as Subgrade 3a, and 93.4 %

(158.70 ha) calculated as being of BMV quality (Grade 2 and Subgrade 3a), as set out in **Table 10-24**. The data include the post-1988 data (Ref. 10-30).

Table 10-24: Calculated ALC grading for the Study Area

ALC Grade	DCO Site Boundary		Proposed Working Area	
	Area (ha)	Percentage	Area (ha)	Percentage
Grade 1 (Excellent quality)	0.0	0.0	0.0	0.0
Grade 2 (Very Good quality)	76.54	12.47	21.29	12.5
Subgrade 3a (Good quality)	469.57	76.48	137.45	80.9
Subgrade 3b (Moderate quality)	18.90	3.08	4.96	2.9
Grade 4 (Poor quality)	0.0	0.0	0.0	0.0
Grade 5 (Very Poor quality)	0.0	0.0	0.0	0.0
Non-agricultural / Urban	48.98	7.98	6.24	3.7
TOTAL	613.99	100.00	169.95	100.0



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PROJECT

Viking CCS Pipeline

LEGEND

- DCO Site Boundary
- Study Area
- Route Section Break

Agricultural Land Classification - Provisional

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban

Agricultural Land Classification - Post 1988

- Grade 2
- Grade 3a
- Grade 3b
- Grade 4
- Not Surveyed
- Other

NOTES:

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FIGURE TITLE

Figure 10-1
Agricultural Land Classification

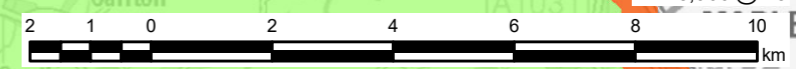
ISSUE PURPOSE

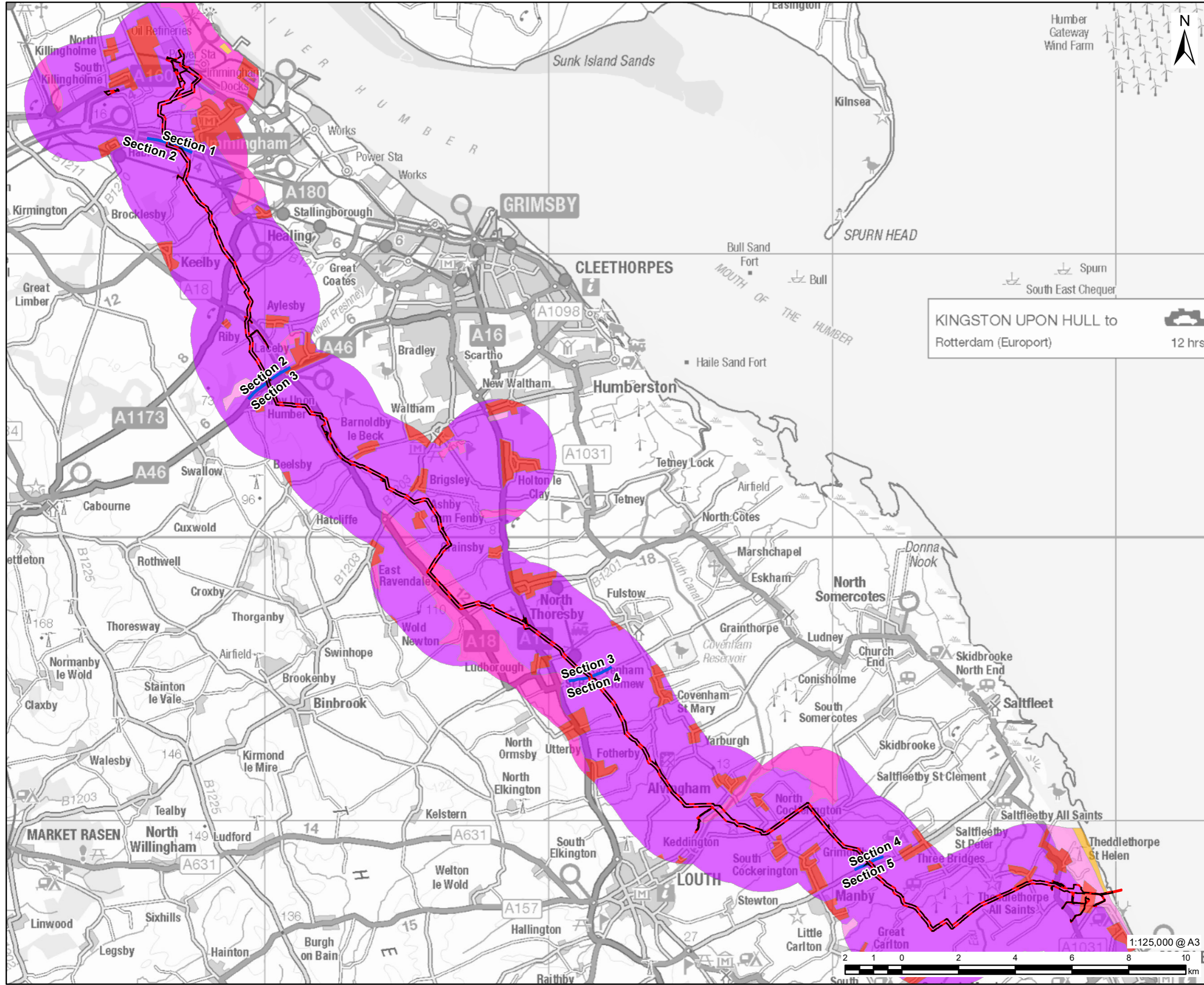
ENVIRONMENTAL STATEMENT

PROJECT NUMBER / REFERENCE

60668955 / VCCS_230914_ES_10-1

KINGSTON UPON HULL to Rotterdam (Europort)
12 hrs





LEGEND

- DCO Site Boundary
- Study Area
- Route Section Break

Predictive BMV Land Assessment

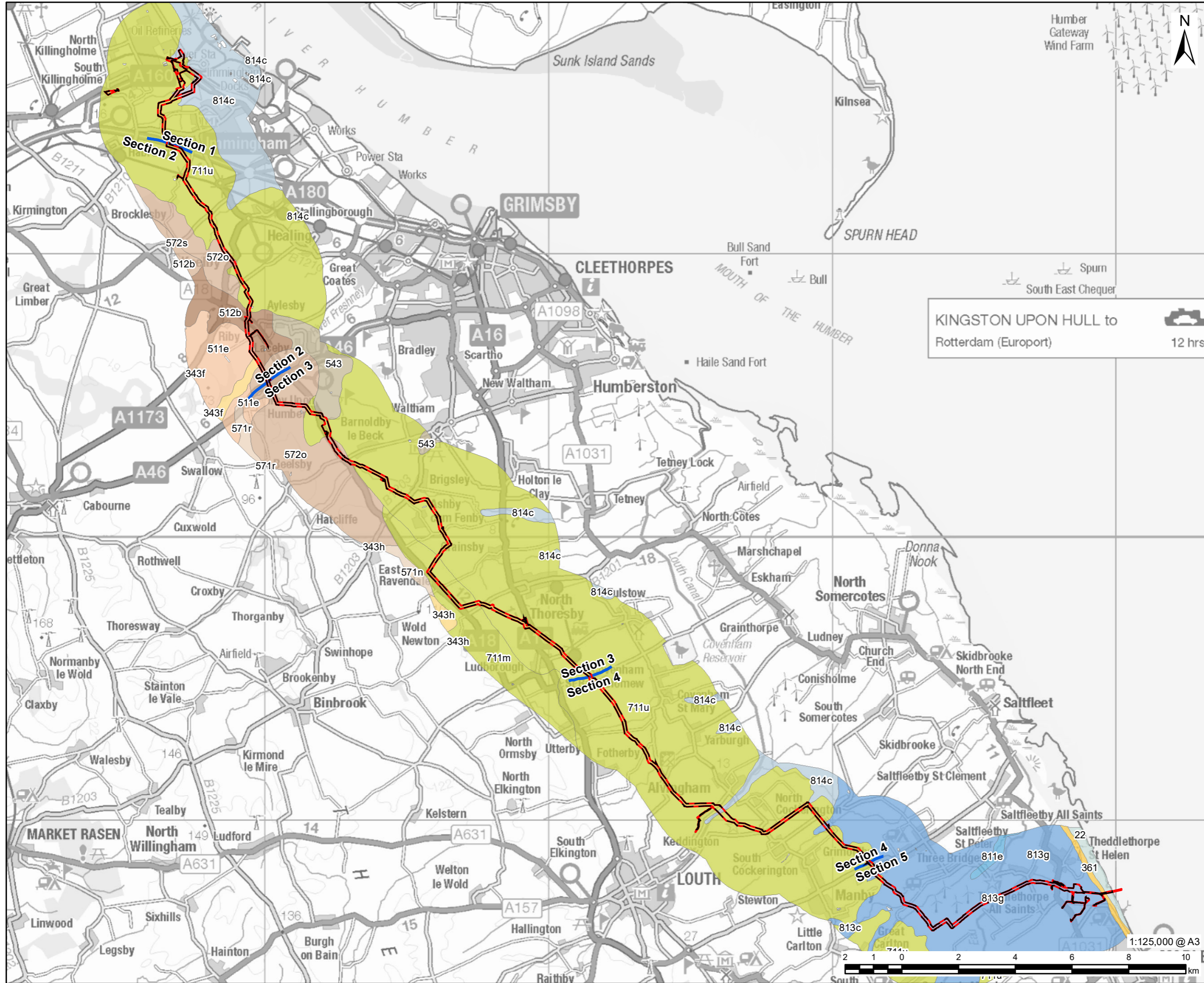
- High likelihood of BMV land (>60% area bm)
- Moderate likelihood of BMV land (20 - 60% area bm)
- Low likelihood of BMV land (<= 20% area bm)
- Non-agricultural use
- Urban

KINGSTON UPON HULL to Rotterdam (Europort)
 12 hrs

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FIGURE TITLE
Figure 10-2
Likelihood of Best and Most Versatile Agricultural Land

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LEGEND

- DCO Site Boundary
- Study Area
- Route Section Break

Soil Associations

- 22 - Saline 1
- 343f - Newmarket 1
- 343h - Andover 1
- 361 - Sandwich
- 511e - Swaffam Prior
- 512b - Landbeach
- 543 - Arrow
- 571n - Tathwell
- 571r - Hunstanton
- 572o - Burlingham 2
- 572s - Bishampton 1
- 711m - Salop
- 711u - Holderness
- 811e - Tanvats
- 813c - Fladbury 2
- 813g - Wallasea 2
- 814c - Newchurch 2

KINGSTON UPON HULL to
 Rotterdam (Europort)
 12 hrs

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FIGURE TITLE
 Figure 10-3
 Soil Associations

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Permanent Loss of Agricultural Land

10.5.69 The permanent loss of BMV land due to the Proposed Development results from land use change from agriculture to above ground-built development. The Immingham Facility will be located within urban and non-agricultural land and therefore does not impact agricultural land. The Theddlethorpe Facility may or may not result in the permanent loss of agricultural land depending upon whether the preferred Option 1 (on non-agricultural land within the former TGT), or Option 2 (on agricultural land) is progressed. To present a worst case, the total permanent agricultural land take due to the Proposed Development is therefore considered to be from:

- The Theddlethorpe Facility (Option 2) located to west of the former TGT site (Section 5);
- The access to Theddlethorpe Facility (Option 2) from the north off the A1031 Mablethorpe Road (Section 5);
- Block Valve Station 1 – Washingdales Lane Block Valve (Section 2);
- Block Valve Station 2 – Thoroughfare Block Valve (Section 3); and
- Block Valve Station 3 – Louth Road Block Valve (Section 4).

10.5.70 The locations of the Block Valve Stations are shown on *Figure 3-10, ES Volume III (Application Document 6.3)*. Each of the Block Valve Stations would be approximately 34 by 32m in size, however as stated in *Chapter 3: Description of the Proposed Development*, of this *ES Volume II*, permanent land acquisition would be 50m x 40m to accommodate associated landscaping such as planting or bunds to provide screening. Using the acquisition area as a worst case, the resulting permanent footprint of each Block Valve Station is 0.2 ha. Block Valve Station 1 in Section 2 is located on Provisional Grade 2 (BMV) land, whereas the Block Valve Stations 2 and 3 (in Sections 3 and 4) are located on Provisional Grade 3 land, which to represent a worst case for the assessment is considered to be Subgrade 3a (BMV). The total permanent loss of BMV land due to the Block Valve Stations is therefore predicted to be 0.6 ha, comprising 0.2 ha of Grade 2 and 0.4 ha of Subgrade 3a land.

10.5.71 To enable the CO₂ to flow from the new 24" pipeline into the existing 36" LOGGS pipeline the Theddlethorpe Facility will be required as detailed in *Chapter 3: Description of the Proposed Development*, of this *ES Volume II*. The exact location of this facility is yet to be confirmed and there are two Options. Option 1 would be to locate the facility on 1.4 ha of non-agricultural land within the former TGT (no loss of agricultural land). Option 2 is all located on agricultural land to the west of the former terminal site on Provisional Grade 3 land. Therefore, to present a worst case for the assessment it is assumed that Option 2 is brought forward and would have a permanent footprint of 2.0 ha of Subgrade 3a BMV land.

10.5.72 The DCO Site Boundary describes the access road to the Theddlethorpe Facility (Option 2) from the A1031 Mablethorpe Road as a corridor approximately 22m wide, which allows space for the construction operations and a small degree of spatial flexibility. The width of the permanent access track however will be narrower, at approximately 6m, resulting in a permanent loss of 0.3 ha of Subgrade 3a BMV land.

10.5.73 As the Theddlethorpe Facility (Option 1) will result in the redevelopment of 1.4 ha of non-agricultural land (existing hardstanding) and no loss of agricultural land, the total permanent loss of agricultural land due to the Proposed Development is therefore 0.2 ha of Grade 2 and 2.7 ha of Subgrade 3a BMV land, due to the Block Valve Stations and the development of Theddlethorpe Facility (Option 2) and its associated access track which are wholly located on agricultural land.

Temporary Loss of Agricultural Land

- 10.5.74 Based on a worst case where all land within the Study Area (apart from the areas of permanent development discussed above) is subject to development / disturbance the temporary and reversible loss of agricultural land (for the duration of construction) would be 76.34 ha of Grade 2 land, 466.87 ha of Subgrade 3a land and 18.92 ha of Subgrade 3b land. The assessment of impacts to agricultural land presented in section 10.7 is based upon these figures to present a worst case.
- 10.5.75 It is also noted that 47.58 ha of non-agricultural / urban land within the Study Area would also be subject to temporary development / disturbance in this worst-case scenario.
- 10.5.76 However, as described previously, the Study Area describes a larger area than would actually be required for the construction of the Proposed Development. As described in paragraph 10.5.66, the Proposed Working Area comprises approximately 169.95 ha, 27.7 % of the land within the Study Area. Although this preferred routing maybe subject to change during detailed design post-consent, this is considered to provide a good approximation of the actual level of disturbance to soils and agricultural land which will occur because of the Proposed Development. The temporary and reversible loss of agricultural land (for the duration of construction) within the Proposed Working Area would be 21.09 ha of Grade 2 land, 135.45 ha of Subgrade 3a land, 4.96 ha of Subgrade 3b land. The remaining agricultural land within the Proposed Working Area comprises the 0.2 ha of Grade 2 land and 2.7 ha of Subgrade 3a land within the areas of permanent development (paragraphs 10.5.69 to 10.5.73).

Soil Resources in the Study Area

- 10.5.77 The purchased NATMAP Vector data identifies eleven soil associations within the Study Area (**Table 10-25**), along with discrete areas of unsurveyed land. The main soil association mapped within the Study Area (62.31 %) is the Holderness Association which occurs throughout the Study Area. The next most common association is Wallasea 2 (17.23 %) which occurs to the south of the Study Area from around Grimoldby and Manby to the coast. The remaining nine soil associations are mapped as covering relatively small areas.
- 10.5.78 Using the criteria set out in IEMA guidance (Ref. 10-23) (**Table 10-6**) three of the eleven mapped associations (Newmarket 1, Sandwich and Saline 1) are classed as being of low sensitivity due to their sandy texture, drainage characteristics and FCD. Seven associations (mainly comprising loamy and clayey soils) are classed as being of medium sensitivity, as they do not fall into Wetness Classes V or IV even when undrained (Ref. 10 24). Additionally, FCD are fewer than 150 (Ref. 10 32). The Salop association comprises loamy clayey soils but is classed as Wetness Class IV when undrained. As the drainage status of the land within the DCO Site Boundary cannot be confirmed at this time, a Wetness Class of IV must be assumed as a worst case resulting in these soils being classed as being of high sensitivity according to **Table 10-6**.

Table 10-25: Soil Associations within the Study Area

Soil Association	General Description (taken from Ref 10.25)	Area (ha) (and % of Section)	Sensitivity*
Newchurch 2 (814c)	Loamy and clayey soils of coastal flats with naturally high groundwater developed over stoneless clayey marine alluvium. Where control is effective soils are only occasionally waterlogged in winter (Wetness Class II) but elsewhere they	24.03 (3.91 %)	Medium

Soil Association	General Description (taken from Ref 10.25)	Area (ha) (and % of Section)	Sensitivity*
	are seasonally waterlogged (Wetness Class III)		
Holderness (711u)	Mainly slowly permeable fine loamy and moderately permeable coarse loamy soils on chalky till and glaciofluvial drift. Also includes narrow strips of clayey alluvial soils. Slowly permeable and seasonally waterlogged or occasionally waterlogged (Wetness Class III to II).	382.60 (62.31 %)	Medium
Burlingham 2 (572o)	Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging (Wetness Classes II or III). Some slowly permeable seasonally waterlogged fine loamy soils. Some well drained fine and coarse loamy soils. Developed over chalky till.	46.04 (7.50 %)	Medium
Landbeach (512b)	Permeable calcareous coarse loamy soils affected by groundwater over glaciofluvial sand and chalky gravel. Some deep, in part non-calcareous fine and coarse loamy soils affected by groundwater. The soils are permeable and either well drained or only occasionally waterlogged (Wetness Classes I or II).	13.94 (2.27 %)	Medium
Swaffham Prior (511e)	Well drained calcareous coarse and fine loamy soils over chalk rubble. Some similar shallow soils. Deep non-calcareous loamy soils in places. (Wetness Class I) Striped and polygonal soil patterns locally. Slight risk of water erosion.	7.79 (1.27 %)	Medium
Newmarket 1 (343f)	Shallow well drained calcareous sandy and coarse loamy soils over chalk or chalk rubble. Some similar deeper sandy soils, often in an intricate striped pattern. Well-drained (Wetness Class I).	1.69 (0.27 %)	Low
Arrow (543)	Developed in glaciofluvial and river terrace deposits, this association is composed predominantly of coarse loamy soils. Because of the variable nature of the underlying drift and differences in soil water regime, local variation in component soil series occurs. The soils are permeable but are seasonally waterlogged on undrained land (Wetness Class II and III), but mostly respond well to drainage	1.27 (0.21 %)	Medium

Soil Association	General Description (taken from Ref 10.25)	Area (ha) (and % of Section)	Sensitivity*
	measures after which they are usually well drained (Wetness Class I).		
Salop (711m)	Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils associated with fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging. Most of the soils when undrained are waterlogged for long periods in winter (Wetness Class IV). Surface waterlogging results from the combination of slowly permeable subsoil and slow surface run-off from relatively flat land. The soils can be improved to Wetness Class III with underdrainage.	29.31 (4.77 %)	High
Wallasea 2 (813g)	Deep stoneless clayey soils developed over reclaimed marine alluvium. Calcareous in places. Some deep calcareous silty soils. (Wetness Class I to II).	105.78 (17.23 %)	Medium
Sandwich (361)	Mainly deep well drained calcareous and non-calcareous sandy soils supporting sand dune and some wetland habitats. Very limited agriculture and coniferous woodland use as the soils are droughty, and unstable when ploughed. Some sparsely vegetated unstable soils. Waterlogged soils in hollows locally. Shingle bars and spits locally extensive.	0.55 (0.09 %)	Low
Saline 1 (0220)	Soils of variable texture flooded by high tides developed over marine alluvium. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.	0.94 (0.15 %)	Low
Waterbodies (no soil cover)		0.04 (0.01 %)	
TOTAL		613.99 (100 %)	

10.5.79 It is noted that the Sandwich and Saline 1 associations do not occur within the Proposed Working Area as described in paragraph 10.5.61.

ALC Grading within Lincolnshire

10.5.80 For comparative purposes **Table 10-26** details the Provisional ALC grading in the administrative areas of NELC, NLC and LCC. The data are taken from the Provisional ALC

(Ref. 10-24 and Ref. 10-26), with an assumed 50:50 split of Grade 3 into Subgrade 3a (BMV) and Subgrade 3b (non-BMV) land (as outlined in paragraph 10.5.14).

- 10.5.81 North East Lincolnshire covers an area of 19,232.0 ha of which the Provisional ALC mapping shows 14,836.1 ha to be agricultural land. The data show all of the agricultural land in the district is classified as Grade 2 or Grade 3, comprising 18.8 % and 58.4 % of the total land area within the district, respectively. The remaining land is classified as urban or non-agricultural. Applying a 50/50 split to the Grade 3 data, 9,224.50 ha (62.2 %) of the available agricultural land within the district is predicted to be of BMV quality.
- 10.5.82 North Lincolnshire covers an area of 84,910.2, ha of which the Provisional ALC mapping shows 78,053.2 ha to be agricultural land. The data show that the majority of the agricultural land in the district is classified as Grade 2 or Grade 3, comprising 43.8 % and 36.8 % of the total land area within the district, respectively. Areas of Grade 1 land area also present (9.7 %), focussed along the flood plain of the River Trent and also present in the Wolds. Grade 4 and 5 land is also present in the district in discrete pockets. Applying a 50/50 split to the Grade 3 data, 61,044.1 ha (78.2 %) of the available agricultural land within the district is predicted to be of BMV quality.
- 10.5.83 Lincolnshire covers an area of 591,821.5 ha of which 566,202.1 ha is agricultural land. The data show that half of the total land area of the County is classified as Grade 3 (50.1 %). Grade 2 is the next abundant comprising 31.6 % of the total land area within the County. Grade 1 land is also present (12.8 %), along with small areas of Grade 4 (1.3 %). Applying a 50/50 split to the Grade 3 data, 410,630.6 ha (72.5 %) of the available agricultural land within the County is predicted to be of BMV quality.
- 10.5.84 The Study Area contains approximately 566.64 ha of agricultural land (**Table 10-24**). This equates to approximately 0.1% of the available agricultural land within Lincolnshire, 0.7 % of the available agricultural land within North Lincolnshire and 3.18 % of the available agricultural land within North East Lincolnshire.
- 10.5.85 Of the agricultural land within the Study Area approximately 547.72 ha has been classified as BMV (**Table 10-24**). This equates to approximately 0.13 % of the available BMV agricultural land within Lincolnshire, 0.90% of the available BMV agricultural land within North Lincolnshire and 5.93% of the available BMV agricultural land within North East Lincolnshire.

Table 10-26: ALC Grading in Lincolnshire

ALC Grade	Area (ha)	Percentage (%) of total land area	Percentage (%) available agricultural land*
North East Lincolnshire			
Grade 1	0.0	0	0
Grade 2	3,612.9	18.8	24.4
Grade 3	11,223.2	58.4	75.6
Grade 4	0.0	0.0	0.0
Grade 5	0.0	0.0	0.0
Non-agricultural	192.7	1.0	-
Urban	4,203.1	21.9	-
Total	19,232.0	100.0	100.0
Total BMV**	9,224.5	48.0	62.2

ALC Grade	Area (ha)	Percentage (%) of total land area	Percentage (%) available agricultural land*
Total agricultural land*	14,836.1		
North Lincolnshire			
Grade 1	8,249.4	9.7	10.6
Grade 2	37,178.6	43.8	47.6
Grade 3	31,232.1	36.8	40.0
Grade 4	1,382.1	1.6	1.8
Grade 5	10.8	0.0	0.0
Non-Agricultural	3,612.0	4.3	-
Urban	3,245.0	3.8	-
Total	84,910.2	100.0	100.0
Total BMV**	61,044.1	71.9	78.2
Total agricultural land*	78,053.2		
Lincolnshire			
Grade 1	75,757.2	12.8	13.4
Grade 2	186,750.2	31.6	33.0
Grade 3	296,246.4	50.1	52.3
Grade 4	7,448.3	1.3	1.3
Grade 5	0.0	0.0	0.0
Non-Agricultural	17,132.6	2.9	-
Urban	8,486.8	1.4	-
Total	591,821.5	100.0	100
Total BMV**	410,630.6	69.4	72.5
Total agricultural land*	566,202.1		
* Excludes land mapped as non-agricultural or urban			
**The land mapped as Grade 3 has been split 50/50 between Subgrades 3a (BMV) and 3b (non-BMV).			

Land Use

10.5.86 The current land-use baseline has been informed by the use of aerial and Streetview© imaging provided by Google. The majority of the Study Area has been identified to be in arable production, this finding corroborates the ALC data presented above, as higher quality (BMV) land is more productive and better suited to arable use than land of lower quality. The arable land is interspersed with permanent pasture and some small to medium woodlands. Therefore, for the purpose of this assessment, it is assumed that agricultural land use is closely related to agricultural land quality and current land use is therefore reflected in the ALC assessment.

Future Baseline

- 10.5.87 The baseline presented in this chapter has the potential to change due to other new developments within the vicinity of the Proposed Development throughout its lifetime, i.e., any new development that would affect the land use or quality, in areas that may be required for access to maintain, decommission and/or upgrade the pipeline. Committed new developments which are lodged within the planning system (or as otherwise agreed with the Planning Authority), are addressed via the cumulative assessment presented in section 10.10 below.
- 10.5.88 Owing to the predominantly temporary nature of the construction phase, it is anticipated that the agricultural baseline will not change significantly as a result of natural processes and systems during this period.
- 10.5.89 It is acknowledged, however, that during the predicted operational lifespan of the Proposed Development, the baseline has the potential to alter due to changes in land use and farming practice. This may include, but is not limited to, the adoption or surrender of Agri-Environmental Schemes (it being noted that under the Agriculture Act 2020 (Ref. 10-6) there is an emphasis towards incentivising landowners to better protect and improve soils); shift from pasture to arable agriculture; and implementation of field drainage schemes. Changes to the baseline may be beneficial or adverse.
- 10.5.90 There is also the potential for long-term changes to the baseline due to climate change. These long-term changes could potentially lead to alterations in agricultural land quality (ALC grade), for example through increased levels of soil wetness in the winter and increased droughts in the summer. This may in turn influence extent and location of BMV land. Changes in rainfall may also affect decomposition rates and soil organic matter content. Changes to the baseline may be beneficial or adverse.
- 10.5.91 Although there is the potential for the baseline presented in this chapter to change over time; it is considered that the data presented provides a good representation of land use and agricultural conditions at this stage of the Proposed Development; and to be a good platform upon which to base the assessment.

10.6 Development Design and Embedded Mitigation

- 10.6.1 EIA is an iterative process which informs the development of the project design. Where the outputs of the preliminary assessment identify likely significant effects changes to the design can be made or mitigation measures can be built-in to the proposal to reduce these effects.
- 10.6.2 This type of mitigation is defined as embedded mitigation, as mitigation measures which have been identified and adopted as part of the evolution of the project design (“embedded” into the project design).
- 10.6.3 The design of the Proposed Development has been further developed to reflect the findings of ongoing environmental studies, comments raised during the statutory consultation and ongoing engagement with stakeholders. As the design has developed, embedded mitigation measures have been refined as part of an iterative process.
- 10.6.4 The Proposed Development has been designed so that the permanent loss of agricultural land is avoided as far as possible. The Immingham Facility and Theddlethorpe Facility (Option 1) will be located within urban and non-agricultural land. The only potential permanent development on agricultural land (permanent loss of agricultural land through above ground-built development) would be due to the installation of three Block Valve Stations and, if required, Theddlethorpe Facility (Option 2) and its access. These have been located in Grade 3 land as far as is practicable, and the Block Valve Stations have been located adjacent to the highway network to reduce the need for additional disturbance/loss of land to accesses. The pipeline has been routed to avoid areas identified as Grade 2 on

the Provisional ALC mapping (Ref. 10-24 and Ref. 10-26) as far as is reasonably practicable.

- 10.6.5 Additionally, Option 1 for Theddlethorpe Facility will reduce the overall amount of temporary soil disturbance and temporary land loss as it will not require extension of the LOGGS pipeline.
- 10.6.6 Furthermore, the informed and sensitive positioning of pipeline routeing and access tracks to the edge of fields, in field boundaries, or through less productive areas of individual fields (where possible in consideration of technical and other environmental requirements) will ensure that the maximum area of productive land remains in agricultural use during the construction period (referred to as micro-siting). Informed route design will also mitigate indirect effects such as field severance and separation of livestock from water supplies.

10.7 Potential Impacts and Assessment of Effects

Introduction

- 10.7.1 This section assesses the potential impacts of the Proposed Development on agricultural land and soil resources during the construction and decommissioning phases. Potential impacts have been assessed based on the methodology outlined in section 10.4 and in *Chapter 5: EIA Methodology, ES Volume II (Application Document 6.2.5)*, where a description of impact definitions is provided in Table 5-2. For soils and agricultural land, the potential impacts can be categorised as loss of agricultural land; and loss of soil functions/volumes and soil-related features.
- 10.7.2 The assessment of potential impacts assumes that the development design and embedded mitigation measures outlined in Section 10.6 are in place.

Assessment of Potential Impacts: Construction Phase

Agricultural Land – Potential Impacts

- 10.7.3 There is the potential for loss of land available for agriculture due to the direct impacts of the Proposed Development. For example, this may be permanent loss through the construction of permanent infrastructure or permanent land use change for example the establishment of permanent landscaping or habitat creation on areas of former agricultural land; or a temporary loss during construction phase only (for example where land above the pipeline and areas used for temporary construction compounds and accesses are restored to agriculture at the end of the construction period).

Agricultural Land – Permanent Loss

- 10.7.4 As described in Section 10.5 as a worst case the loss of agricultural land to the development of Theddlethorpe Facility Option 2 and its access, and the three Block Valve Stations is considered to be permanent. However, as described in *Chapter 3: The Viking CCS Pipeline ES Volume II (Application Document 6.2.3)* it is intended that these structures will be removed and the land reinstated to agricultural use on decommissioning (long-term reversible loss). It is calculated that the permanent loss of agricultural land due to the Proposed Development would be 0.2 ha of Grade 2 land and 2.7 ha of Subgrade 3a land.
- 10.7.5 Using the criteria set out in **Table 10-5** the sensitivity of the Grade 2 (BMV) land is classified as Very High. Due to the scale of the permanent, irreversible loss (less than 5 ha) the magnitude of change from the baseline (**Table 10-7**) is considered to be low and the overall impact (**Table 10-8**) is moderate adverse leading to a significant effect. As noted in Section 10.4, the criteria set out in the IEMA guidance (Ref. 10-23) result in any permanent loss of Grade 1 or Grade 2 agricultural land being classed as significant regardless of the scale of that loss. It is also noted that the permanent loss of Grade 2 land equates to 0.0001% of

Grade 2 land in Lincolnshire, 0.0005 % of Grade 2 land in North Lincolnshire, and 0.0055 % of Grade 2 land in North East Lincolnshire.

10.7.6 Using the criteria set out in **Table 10-5** the sensitivity of the Subgrade 3a (BMV) land is classified as High. Due to the scale of the permanent, irreversible loss (less than 5 ha) the magnitude of change from the baseline (**Table 10-7**) is considered to be low and the overall impact (**Table 10-8**) is minor adverse leading to an effect which is not significant.

Agricultural Land – Temporary Loss

10.7.7 Based on a worst case where all other agricultural land within the Study Area is subject to development/disturbance the potential impacts of the temporary and reversible loss of agricultural land (for the duration of construction) are assessed below. It is noted that, as set out in paragraph 10.5.76, the actual area of loss would be smaller as the Proposed Working Area (based upon the current preferred routeing) occupies approximately 27.7 % of land within the Study Area.

10.7.8 As described above land above the pipeline and areas of temporary development (e.g., land used for temporary construction compounds and accesses) will be restored to agriculture at the end of the construction period. However, without appropriate measures to ensure the correct management of the soil resources which support this land there is the potential for losses or reductions in soil functions or soil volumes that could potentially restrict or prevent the pre-construction land use from being reinstated – i.e., downgrading of the ALC grading post-construction.

10.7.9 Using the criteria set out in **Table 10-6** the sensitivity of the Grade 2 (BMV) land is classified as very high. Due to the scale of temporary loss (76.34 ha - greater than 20 ha) and the potential for land quality downgrading the magnitude of change from the baseline (**Table 10-8**) is considered to be high and the overall impact (**Table 10-9**) is very major adverse leading to a significant effect.

10.7.10 Using the criteria set out in **Table 10-6** the sensitivity of the Subgrade 3a (BMV) land is classified as high. Due to the scale of temporary loss (466.87 ha - greater than 20 ha) and the potential for land quality downgrading the magnitude of change from the baseline (**Table 10-8**) is considered to be high and the overall impact (**Table 10-9**) is major adverse leading to a significant effect.

10.7.11 Using the criteria set out in **Table 10-6** the sensitivity of the Subgrade 3b (non-BMV) land is classified as medium. Due to the scale of temporary loss (18.90 ha – between 5 and 20 ha) and the potential for land quality downgrading the magnitude of change from the baseline (**Table 10-8**) is considered to be medium and the overall impact (**Table 10-9**) is moderate adverse leading to a significant effect.

10.7.12 It is also noted that the land within the Study Area also supports the internationally and nationally designated habitats of the Saltfleetby - Theddlethorpe Dunes SAC, NNR and SSSI and the Humber Estuary SPA and Ramsar site and therefore from **Table 10-6** the sensitivity of this land is considered to be very high. However, the Proposed Development would not directly impact this land (which is classed as non-agricultural) and consequently magnitude of impact would be 'no change' and the potential impact (**Table 10-9**) is no change leading to an effect which is not significant.

10.7.13 Given the assessment's conclusions that with only design and embedded mitigation in place there would be a potentially significant adverse effect, the additional mitigations outlined in section 10.8 will be undertaken. These additional measures comprise standard industry good practice measures for the maintenance of soil and land quality, such as those set out in Defra's Code of Practice (Ref. 10-12) and are also reported in the Outline SMP, as presented in *ES Volume IV: Appendix 10.1 (Application Document 6.4.10.1)*. An assessment of the residual effects taking account of those mitigation measures is set out in section 10.9.

Soil Resources - Potential Impacts

10.7.14 Construction (and decommissioning) activities that will cause disturbance to and potentially impact upon soil resources include the following:

- stripping and stockpiling of topsoil and subsoil, storage and reinstatement;
- ground excavation;
- trenchless drilling;
- stockpiling materials;
- levelling ground;
- trenching;
- haul road construction;
- vehicle movements onsite; and
- construction of permanent infrastructure.

10.7.15 The disturbance of soil resources may occur *in situ*, for example through trafficking by vehicles or through soil removal, handling, storage and subsequent reinstatement. This disturbance may result in the impairment of soil function, quality and resilience. This effect comprises such changes as:

- compaction and smearing (damage to soil structure);
- conditions within the soil profile conducive to excessive drying or wetness;
- mixing of distinct soil horizons (e.g., topsoil with subsoil) reducing their potential reuse;
- damage or removal of vegetation layer;
- changes in the soil profile stone content;
- loss of nutrients (e.g., nitrogen), biota (e.g., bacteria, fungi, earthworms) and reduction in soil fertility; and
- loss of ecosystem services, such as the ability of the soil to support food production and habitat creation.

10.7.16 During the construction, there may be a physical loss of soil resource as a result of inappropriate management of soils during removal, handling and storage in the construction phase, where soils are temporarily stripped to enable construction activities. Loss of soils may also include the unauthorised exportation of soil resources. It is assumed that in the areas of temporary development, all soil resources will be retained onsite and not exported for reuse elsewhere. There is unlikely to be surplus soil from the proposed permanent development, if this is to occur all soil will be retained for reuse on site.

10.7.17 The inappropriate removal, handling and storage of soil resources during construction activities may also render them unsuitable for reuse in site restoration and, therefore, also constitutes a loss of soil resource (e.g. the mixing of topsoil and subsoil; the mixing of soils of differing textures, or the mixing of soils with non-soil substrate or other unsuitable materials) as this mixing cannot be reversed nor the constituent materials returned to their original state. Incorrect handling leading to mixing and loss of suitability is considered the greatest risk to soil retention.

10.7.18 The loss of soil resource may result in the impairment of the remaining soils' function, quality and resilience. This also comprises such changes as reduction of topsoil depth.

10.7.19 During large-scale projects, there is the potential for disease and pathogen transfer between different areas of agricultural land (i.e., a biosecurity risk). This is considered in the loss of

soil resource as the main cause of potential disease and pathogen transfer and is due to the transfer of soil from infected to uninfected areas via heavy plant.

Soil Resources - Loss of soil functions/volumes and soil-related features

- 10.7.20 As described above without appropriate measures to ensure the correct management of the soil resources within the Study Area there is the potential for permanent, irreversible loss of one or more soil functions or soil volumes as described in **Table 10-7**. Such measures are not delivered through the embedded and design mitigation described in Section 10.6 and therefore cannot be considered here, but nonetheless are considered standard industry good practice.
- 10.7.21 Using the criteria set out in **Table 10-6**, soils of the Newmarket 1, Sandwich and Saline 1 associations are classed as low sensitivity. These soils comprise approximately 3.18 ha of the Study Area and therefore the scale at which permanent, irreversible losses of soil functions or soil volumes could occur in these soils (less than 5 ha) leads to the magnitude of change from the baseline being classed as low (**Table 10-8**). The overall impact (**Table 10-9**) is assessed as negligible leading to an effect which is not significant.
- 10.7.22 Using the criteria set out in **Table 10-6**, soils of the Newchurch 2, Holderness, Burlingham 2, Landbeach, Swaffham Prior, Arrow and Wallasea 2 associations are classed as medium sensitivity. These soils comprise approximately 581.46 ha of the Study Area and therefore the scale at which permanent, irreversible losses of soil functions or soil volumes could occur in these soils (greater than 20 ha) leads to the magnitude of change from the baseline being classed as high (**Table 10-7**). The overall impact (**Table 10-8**) is assessed as moderate adverse leading to a significant effect.
- 10.7.23 Using the criteria set out in **Table 10-6**, soils of the Salop association are classed as high sensitivity. These soils comprise approximately 29.31 ha of the Study Area and therefore the scale at which permanent, irreversible losses of soil functions or soil volumes could occur in these soils (greater than 20 ha) leads to the magnitude of change from the baseline being classed as high (**Table 10-7**). The overall impact (**Table 10-8**) is assessed as major adverse leading to a significant effect.
- 10.7.24 Given the assessment's conclusions that with only design and embedded mitigation in place there would be a potentially significant adverse effect, the additional mitigations outlined in section 10.8 will be undertaken. These additional measures comprise standard industry good practice measures for the maintenance of soil and land quality, such as those set out in Defra's Code of Practice (Ref. 10-12) and are also reported in the Outline SMP, as presented in *ES Volume IV: Appendix 10.1 (Application Document 6.4.10.1)*. An assessment of the residual effects taking account of those mitigation measures is set out in section 10.9.

Assessment of Potential Impacts: Operational Phase

- 10.7.25 Operational phase activities with potential to impact upon agriculture and soils, i.e., maintenance and emergency repairs, will be limited and will be of a significantly smaller scale than experienced at construction. Therefore, with the agreement with the Planning Inspectorate (Section 10.3 and **Table 10-3**), operational effects have been scoped out.

Assessment of Potential Impacts: Decommissioning Phase

Agricultural Land and Soil Resources

- 10.7.26 The scale and nature of activities undertaken during decommissioning would be similar to those undertaken during construction, and would be temporary, only occurring during the period of decommissioning activities on site. Following the removal of the structures and the reinstatement of the land there would be no further potential effects on agricultural land and soil resources. Therefore, within the assessment the impacts of decommissioning are not

assessed separately and are instead regarded as being no greater than those anticipated at construction.

Sensitivity analysis

10.7.27 The level of confidence in the results presented above is high, and worst cases have been assumed throughout. The ALC grading is sufficiently understood to provide a robust assessment. The design is sufficiently developed to understand where existing infrastructure will be utilised and where new permanent development will occur. The potential impacts which can occur if appropriate measures for the sustainable management of soils are not in place are well understood.

10.8 Additional Mitigation and Enhancement Measures

Additional Mitigation and Enhancement – Construction Phase

10.8.1 The Draft Construction Environmental Management Plan (CEMP), a copy of which is included in *ES Volume IV: Appendix 3.1, (Application Document 6.4.3.1)* sets out the additional mitigation measures identified in this assessment of likely significant effects. This section summarises the types of mitigation measures that will be considered to mitigate against the effects on agriculture and soils where required. Each entry in the Mitigation Register included within the Draft CEMP has an alpha-numerical reference e.g., “B1” to provide a cross reference to the secured commitment. These measures will be adopted during the construction phase.

- **B16:** Topsoil stripping should be undertaken outside of the winter period (October to March inclusive) where possible. If there is more than 15mm of rain over 24hr period then topsoil stripping should cease until the soil is dry or 24 hours has passed, whichever is the sooner, or as agreed with Lands Officer;
- **E4:** Produce an environmental emergency response plan which will detail such measures as making appropriate equipment (e.g., spill kits, absorption mats) easily accessible on-site and training personnel in using them. The plan should include clear protocols and communication channels to ensure that any spillages are dealt with immediately and adequately. This will prevent large areas of soil / geology potentially becoming contaminated and in turn protect surface water quality;
- **F1:** Prepare a detailed Soil Management Plan following the guidance in the Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (or updated version thereof) and other relevant documents such as The Institute of Quarrying’s Good Practice Guide for Handling Soils in Mineral Workings. This plan will be based upon the Outline Soil Management Plan presented within ES Volume IV: Appendix 10.1, (Application Document 6.4.10.1);
- **F2:** Soil handling operations will be undertaken in line with the Soil Management Plan and appropriately supervised to ensure that they are suitable for re-use within the Proposed Development. Stockpiles will be placed away from watercourse to avoid runoff. The appropriate management of soil resources will maintain soil volumes and quality to prevent loss/lowering of ALC grade between pre- and post-construction and thus potential loss of BMV status;
- **F3:** Access to agricultural lands will be maintained throughout the construction process, as far as is practicable;
- **F4:** Damage to the agricultural capability of soils will be avoided by the use of best practice in soil stripping, handling and storage of soil materials;

- **F5:** Existing field drainage systems will be re-instated to ensure that land capability is maintained, and drainage related to flooding issues will not be worsened;
- **F6:** Access to water supplies for all fields will be maintained where possible;
- **F7:** Where a pre-existing problem with eelworm or other pests or diseases is identified tests will be taken before entry and the analysis results sent to Harbour Energy/ landowner prior to entry;
- **F8:** Where required pests and diseases tests will be carried out on any imported topsoil before it comes on Site and the analysis results sent to Harbour Energy/ landowner;
- **F9:** Soil testing of any imported soils to the relevant British Standard for topsoil (BS3882:2007) or subsoil (BS8601:2013) will be undertaken to ensure similarity to the in-situ soils and its suitability for reuse.
- **F10:** Following completion of construction operations all agricultural land taken temporarily would be fully reinstated as near as practically possible to its former condition. Topsoil would be prepared and, where required (for example for the reinstatement of permanent pasture) sown using an appropriate seed mix as agreed by the landowner;
- **F11:** To ensure that the maximum area of productive land remains in agricultural use during the construction period pipeline routeing and access tracks will be directed to the edge of fields, in field boundaries, or through less productive areas of individual fields wherever practicable, taking into account other environmental, socio-economic and engineering constraints;
- **F12:** Targeted pre-commencement soil and ALC surveys on land that will be subject to direct disturbance to aid in the production of and implementation of the Soil Management Plan, as well as providing baseline land quality data for the success of reinstatement within the pipeline working corridor to be measured against;
- **F13:** Temporary land-take areas will be reinstated to agricultural use, unless otherwise identified for habitat enhancement - any agreed controls over the exact post-reinstatement land use (either set out in the ES or through landowner consultation) will be clearly identified;
- **G2:** The location and condition of existing land drainage will be established and a record compiled. Subject to landowner/occupier agreement, existing drains should be restored, or new drains established to help prevent damage to soil structure, maintain work areas in a dry condition and to enable current drainage systems to continue to operate through the construction period; and
- **G33:** Produce an Environmental Emergency Response Plan documenting measures to prevent pollutants infiltrating into the soils beneath the site and reaching surface and groundwater receptors.

10.8.2 As set out in measure F1, a detailed Soil Management Plan (SMP) will be produced as part of the CEMP. The draft DCO (*Application Document 2.1*) requirement 5 secures that no stage of the Proposed Development can commence until a CEMP is submitted to and approved by the relevant planning authority. Requirement 5(4) requires the Proposed Development to be undertaken in accordance with the approved CEMP. An Outline SMP is provided in *ES Volume IV: Appendix 10.1 (Application Document 6.4.10.1)*, which provides a framework within which the appointed Contractor (including any sub-contractors or suppliers) will plan, implement and deliver good practice soil management to protect soil resources against damage and loss during the construction phase of the Proposed Development. This will be achieved through the adoption of industry standard methods for the handling and storage of soils appropriate to the soil types identified. The Outline SMP

will be developed into a Detailed (or construction issue) SMP prior to the start of construction by a suitably experienced or qualified soil scientist and will be informed by the detailed pre-construction soil surveys. The implementation of the Detailed SMP is secured through requirement 5(4) of the draft DCO (*Application Document 2.1*).

10.8.3 Measures set out in the Outline SMP include, but are not limited to, the following:

- handling of soil resources only when sufficiently dry to prevent compaction and damage to soil structure, generally limiting soil operations to the months April to October (although this period may be extended during dry periods) and taking account of prevailing weather conditions;
- no soil handling to be carried out when the soil moisture content is above the lower plastic limit;
- stripping, handling, storage and transportation of topsoil separately from subsoil;
- appropriate seeding of soil storage mounds if required for a period longer than six months, to prevent erosion and to maintain soil structure, nutrient content and biological activity;
- de-compacting of the subsoil before topsoil re-instatement to ensure adequate infiltration and drainage;
- minimising the number of machine movements across topsoil to reduce compaction and retain soil structure;
- no trafficking/driving of vehicles/plant or materials storage to occur outside designated areas;
- no trafficking/driving of vehicles/plant on reinstated soil (topsoil or subsoil);
- only direct movement of soil from donor to receptor areas (no triple handling and/or ad hoc storage);
- no mixing of topsoil with subsoil, or of soil with other materials;
- soil only to be stored in designated soil storage areas;
- all plant and machinery must always be maintained in a safe and efficient working condition;
- daily records of operations undertaken, and site and soil conditions should be maintained;
- low ground pressure (LGP models) or tracked vehicles should be used where possible; and
- development of a land drainage strategy, led by a land drainage specialist, for both pre-construction and post-construction.

10.8.4 These standard soil management measures are considered to provide appropriate protection to the majority of the soil resources identified within the Study Area which are of low or medium sensitivity.

10.8.5 As described in **Table 10-25** the soils of the Salop association found in Section 3 to the east of the A18 and East Ravendale and Wold Newton are considered to be of high sensitivity and therefore may require further bespoke measures (beyond those applied to the rest of the soils within the Study Area) to ensure their protection should they be directly impacted by works at the construction phase of the Proposed Development or during maintenance operations. These measures will focus on ensuring that these clayey soils which are prone

to waterlogging are only handled when appropriately dry or that specific methods for wet working are in place.

- 10.8.6 It is also noted that the soils of the Sandwich association (deep well drained sandy soils supporting sand dune habitats), which are classed as low sensitivity are highly prone to wind erosion (Ref. 10-35) and therefore could require specific measures to protect temporary stockpiles from erosion and soil loss. However, based upon the current design (see *Chapter 3: Description of the Proposed Development*) impacts to these soils will be mitigated through avoidance (embedded mitigation) as these soils coincide with the designated habitats of the Saltfleetby - Theddlethorpe Dunes SAC, NNR and SSSI and the Humber Estuary SPA and Ramsar site. Therefore, it is likely that impacts to these habitats, and hence the soils that support them, will be avoided as far as is practicable.
- 10.8.7 The post-consent/pre-commencement detailed soil surveys will accurately identify the extent of highly sensitive soils within the working area and detail field scale mitigation measures that may be required during construction. This information will be available for any maintenance operations that may occur in the future. The mitigation measures included within the Detailed SMP (which will be informed by the detailed soil survey pre-commencement) will allow for the dynamic management of the soils and adapt to site conditions as they occur.

Additional Mitigation and Enhancement – Operational Phase

- 10.8.8 It is expected that works plans/method statements (or similar) for maintenance works would contain appropriate measures for the sustainable management of soil resources. As stated above, information from the detailed pre-commencement soil survey and detailed SMP will be available to inform these documents.

Additional Mitigation and Enhancement – Decommissioning Phase

- 10.8.9 It is expected that the mitigation measures employed at decommissioning would be the same as or similar to those set out in the detailed SMP, taking into account any changes in guidance or best practice which may occur in the intervening period.

10.9 Residual Effects

Assessment of Residual Effects: Construction Phase

Agricultural Land – Permanent Loss

- 10.9.1 The residual effects on agricultural land due to permanent loss due to the construction of permanent infrastructure or permanent land use change remain as assessed in Section 10.7 as impacts cannot be further mitigated. These are included in **Table 10-27**.

Agricultural Land – Temporary Loss

- 10.9.2 Based on a worst case where all other agricultural land within the Study Area is subject to development/disturbance the potential impacts of the temporary and reversible loss of agricultural land (for the duration of construction) are assessed below.
- 10.9.3 The pipeline and areas of temporary development (e.g., land used for temporary construction compounds and accesses) will be restored to agriculture at the end of the construction period. With the additional mitigation measures set out in Section 10.7 and the Outline SMP in *ES Volume IV: Appendix 10.1 (Application Document 6.4.10.1)* in place there would be no discernible loss or reduction in soil functions or soil volumes that restrict or prevent the pre-construction land use from being reinstated (i.e., no downgrading of land quality would occur). The magnitude of change from the baseline conditions would therefore be negligible (**Table 10-7**).

- 10.9.4 Using the criteria set out in **Table 10-5** the sensitivity of the Grade 2 (BMV) land is classified as very high and the magnitude of change from the baseline (**Table 10-7**) would be negligible. The overall impact (**Table 10-8**) is therefore minor adverse leading to a residual effect which is not significant.
- 10.9.5 Using the criteria set out in **Table 10-5** the sensitivity of the Subgrade 3a (BMV) land is classified as high and the magnitude of change from the baseline (**Table 10-7**) would be negligible. The overall impact (**Table 10-8**) is therefore minor adverse leading to a residual effect which is not significant.
- 10.9.6 Using the criteria set out in **Table 10-5** the sensitivity of the Subgrade 3b (non-BMV) land is classified as medium and the magnitude of change from the baseline (**Table 10-7**) would be negligible. The overall impact (**Table 10-8**) is therefore negligible leading to a residual effect which is not significant.
- 10.9.7 The residual effects of the non-agricultural land supporting the internationally and nationally designated habitats of the Saltfleetby - Theddlethorpe Dunes SAC, NNR and SSSI and the Humber Estuary SPA and Ramsar site remain as assessed in Section 10.7, not significant.

Soil Resources – Loss of Soil Functions/Volumes and Soil-Related Features

- 10.9.8 With the additional mitigation measures set out in Section 10.7 and the Outline SMP (*ES Volume IV: Appendix 10.1 (Application Document 6.4.10.1)*) in place there would be no discernible loss or reduction in soil functions or soil volumes and hence soil related features would be protected. The magnitude of change from the baseline conditions would therefore be negligible (**Table 10-7**).
- 10.9.9 Using the criteria set out in **Table 10-6**, soils of the Newmarket 1, Sandwich and Saline 1 associations are classed as low sensitivity and the magnitude of change from the baseline (**Table 10-7**) would be negligible. The overall impact (**Table 10-8**) is therefore negligible leading to a residual effect which is not significant.
- 10.9.10 Using the criteria set out in **Table 10-6**, soils of the Newchurch 2, Holderness, Burlingham 2, Landbeach, Swaffham Prior, Arrow and Wallsea 2 associations are classed as medium sensitivity and the magnitude of change from the baseline (**Table 10-7**) would be negligible. The overall impact (**Table 10-8**) is therefore negligible leading to a residual effect which is not significant.
- 10.9.11 Using the criteria set out in **Table 10-6**, soils of the Salop association are classed as high sensitivity and the magnitude of change from the baseline (**Table 10-7**) would be negligible. The overall impact (**Table 10-8**) is therefore minor adverse leading to a residual effect which is not significant.

Assessment of Residual Effects: Operational Phase

- 10.9.12 Operational phase activities with potential to impact upon agriculture and soils, i.e., maintenance and emergency repairs, will be limited and will be of a significantly smaller scale than experienced at construction. Therefore, with the agreement with the Planning Inspectorate (Section 10.3 and **Table 10-3**), operational effects have been scoped out.

Assessment of Residual Effects: Decommissioning Phase

- 10.9.13 The scale and nature of activities undertaken during decommissioning would be similar to those undertaken during construction, and would be temporary, only occurring during the period of decommissioning activities on site. Following the removal of the structures and the reinstatement of the land there would be no further potential effects on agricultural land and soil resources. Therefore, within the assessment the impacts of decommissioning are not assessed separately and are instead regarded as being no greater than those anticipated at construction.

10.9.14 It is noted that at decommissioning it is anticipated that the permanent development at the Block Valve Stations, Theddlethorpe Facility (Option 2) and its associated access track would be removed and the land reinstated to its pre-development agricultural use (*Chapter 3: Description of the Proposed Development, of this ES Volume II*). The reinstatement of 2.9 ha of BMV agricultural land is considered to be not significant.

Table 10-27: Summary of Construction Phase Residual Effects

Receptor	Sensitivity	Description of Potential Impact	Potential Effect		Mitigation Measure(s)	Residual Effect	
			Magnitude	Significance		Magnitude	Significance
0.2 ha of Grade 2 agricultural land	Very High	Permanent, irreversible loss of agricultural land, due to development and/or land use change	Low	Moderate adverse (Significant)	Design measures to avoid land of higher grading where possible have reduced the permanent loss of BMV land as far as practicable. However, this loss is unavoidable and cannot be mitigated as all land within the area where the Block Valve Station is required is classed as Grade 2. No additional measures can be applied.	Low	Moderate adverse (Significant)
2.7 ha of Subgrade 3a agricultural land	High	Permanent, irreversible loss of agricultural land, due to development and/or land use change	Low	Minor adverse (Not Significant)	Design measures to avoid land of higher grading where possible. No additional measures can be applied.	Low	Minor adverse (Not Significant)
Grade 2 agricultural land	Very High	Loss of agricultural land, including reduction in ALC grading, as a result of construction activities.	High	Very major adverse (Significant)	Adherence to industry standard good practice measures such as set out in Section 10.8 and the Outline SMP (<i>ES Volume IV: Appendix 10.1 (Application Document 6.4.10.1)</i>) will ensure that the land is restored to its pre-development ALC grading (or better).	Negligible	Minor adverse (Not Significant)
Subgrade 3a agricultural land	High	Loss of agricultural land, including reduction in ALC grading, as a result of construction activities.	High	Major adverse (Significant)		Negligible	Minor adverse (Not Significant)

Receptor	Sensitivity	Description of Potential Impact	Potential Effect		Mitigation Measure(s)	Residual Effect	
			Magnitude	Significance		Magnitude	Significance
Subgrade 3b agricultural land	Medium	Loss of agricultural land, including reduction in ALC grading, as a result of construction activities.	Medium	Moderate adverse (Significant)	Land reinstated to agricultural production	Negligible	Negligible (Not Significant)
Land supporting internationally and nationally designated ecological sites	Very High	Reduction in the ability of the land to support the protected features.	No change	No change (Not Significant)	Design measures have avoided development in this area, direct impacts will not occur.	No change	No change (Not Significant)
Soil resources within the Study Area	High	Loss of soil functions/volumes and soil related features	High	Major adverse (Significant)	Adherence to industry standard good practice measures such as set out in Section 10.8 and the Outline SMP (ES Volume IV: Appendix 10.1 (<i>Application Document 6.4.10.1</i>)) will ensure that there is no discernible loss or reduction in soil functions or soil volumes and hence that soil related features would be protected	Negligible	Minor adverse (Not Significant)
	Medium		High	Moderate adverse (Significant)		Negligible	Negligible (Not Significant)
	Low		Low	Negligible (Not Significant)		Negligible	Negligible (Not Significant)

Table 10-28: Summary of Decommissioning Phase Residual Effects

Receptor	Sensitivity	Description of Potential Impact	Magnitude	Significance	Mitigation Measure(s)	Residual Effect	
						Magnitude	Significance
Residual effects will be the same or no worse than assessed at construction – see Table 10-27 .							

10.10 Cumulative Effects

Assessment of Intra-Project Effects

Assessment of effects related to the Proposed Development

10.10.1 The receptors identified within this chapter may also qualify as receptors for other technical disciplines. For example, this chapter (*Chapter 10: Agriculture & Soils*) may have receptors in common with the *Chapter 6: Ecology & Biodiversity* and *Chapter 9: Geology and Hydrogeology* of this *ES Volume II*, (*Application Documents 6.2.6 and 6.2.9*). Intra-cumulative effects with the ecology chapter comprise those associated with the loss of agricultural land (associated with for example ground-nesting birds). For more detail regarding this (and any other intra-cumulative effects identified), reference should be made to *Chapter 20: Cumulative Effects* of this *ES Volume II*, *Application Document 6.2.20*.

Assessment of effects related to the wider Viking CCS Project

10.10.2 As outlined in *Chapter 1: Introduction*, the Proposed Development forms one element of the wider Viking CCS Project, along with the offshore repurposing and extension of the LOGGS pipeline and construction of a new not permanently attended installation (NPAI).

10.10.3 However, as the other elements of the Viking CCS Project are all offshore (i.e., not terrestrial) there is no potential for intra-Project cumulative effects on agricultural land and soil resources to occur.

Assessment of Inter-Project Effects

10.10.4 A list of 51 developments were identified for inclusion within the short list to be considered cumulatively with the Proposed Development through agreement between the Applicant and the Local Planning Authorities. Details of the schemes are provided in *Chapter 20: Cumulative Effects*, *ES Volume II* (*Application Document 6.2.20*).

Loss of soil functions/volumes and soil related features

10.10.5 Cumulative effects to soil resources and their related features only occur where the same soils are directly impacted by more than one development. **Table 20-9** of *Chapter 20: Cumulative Effects* of this *ES Volume II*, *Application Document 6.2.20*, identifies three shortlisted developments with boundaries which overlap with the Proposed Development. These all occur within Section 1 at Immingham as shown on **Figure 20-2** (*ES Volume III*, *Application Document 6.3*):

- #NLC CULM-9 Gigastack Project (Orsted Gigastack Limited and Phillips 66 Limited) intersects with Section 1 of the DCO Site Boundary at Immingham;
- #NLC CULM-12 Humber Zero Project (Phillips 66 Limited) intersects with Section 1 of the DCO Site Boundary at Immingham; and
- #NLC CULM-13 Humber Zero Project (VPI Immingham LLP) intersects with Section 1 of the DCO Site Boundary at Immingham.

10.10.6 It is expected that like the Proposed Development, in order to conform with planning policy and good practice, these other developments will be required to commit to following industry standard best practice and guidance, promoting the sustainable reuse of soils, and it is reasonable to assume that this will be secured through Planning Condition.

10.10.7 The above developments are all located on land identified as supporting soils of the Holderness and/or Newchurch 2 soil associations (Figure 10-3). As set out in Section 10.9, with the good practice measures which will be implemented through the SMP (as secured through the DCO) the impacts to these medium sensitivity soil resources due to the Proposed Development are assessed as negligible. Therefore, the Proposed Development

cannot meaningfully contribute to any significant cumulative effect which may occur. However, it is also noted that given the assumed application of industry standard best practice and guidance by all projects, the cumulative impact would be no worse than minor adverse and likely negligible, and therefore not significant.

Agricultural land

- 10.10.8 The Proposed Development will result in the loss of land from agricultural use. The majority of this loss will be short-term temporary – for the duration of construction only; however, for the Block Valve Stations and Theddlethorpe Facility (Option 2) and its access the loss will be long-term temporary with the land being restored to agricultural use at the end of the operational lifetime of the pipeline. To represent a worst case for the assessment this long-term loss is considered to be permanent.
- 10.10.9 As discussed in **Table 10-26**, it is estimated that 72.5 % of the available agricultural land in Lincolnshire is of BMV quality, therefore it is likely that where any of the 51 shortlisted developments are located on agricultural land there is the potential for the loss of BMV land to occur. Due to the type and nature of the shortlisted developments this loss has the potential to be temporary (e.g., other pipelines and temporary works areas) or permanent (e.g., residential developments). There is insufficient information available for these developments to accurately determine the scale of loss or which ALC grades would be impacted.
- 10.10.10 The permanent loss of 0.2 ha of Grade 2 land due to the Proposed Development is assessed as Moderate adverse and significant. As set out in Section 10.4 permanent/irreversible losses of very high sensitivity Grade 2 land over 20 ha would result in a Very Major impact and a significant effect. Given the scale and type of the shortlisted developments and the prevalence of Grade 2 land within Lincolnshire (calculated to be 33 % of the available agricultural land, (**Table 10-26**)) as a worst case it must be considered that there is potential for a cumulative loss of greater than 20 ha of Grade 2 land to occur. The cumulative impact due to the permanent loss of Grade 2 land must therefore be considered Very Major resulting in a significant effect. However, it must be noted that the Proposed Development's contribution to this is very small at only 0.2 ha. It is also noted that using the criteria set out in the IEMA guidance (Ref. 10-23) results in a significant effect whenever permanent loss of Grade 2 land occurs regardless of scale.
- 10.10.11 The permanent loss of 2.7 ha of Subgrade 3a land due to the Proposed Development is assessed as Minor adverse and not significant. As set out in Section 10.4 permanent/irreversible losses of high sensitivity Subgrade 3a land over 20 ha would result in a Major impact and a significant effect. Given the scale and type of the shortlisted developments and the prevalence of Subgrade 3a land within Lincolnshire (calculated to be 26.2 % of the available agricultural land, (**Table 10-26**)) as a worst case it must be considered that there is potential for a cumulative loss of greater than 20 ha of Subgrade 3a land to occur. The cumulative impact due to the permanent loss of Subgrade 3a land must therefore be considered Major resulting in a significant effect. However, it must be noted that the Proposed Development's contribution to this is small at only 2.7 ha.
- 10.10.12 As set out in **Table 10-27** the temporary losses of Grade 2 and Subgrade 3a land due to the Proposed Development are assessed as Minor adverse and not significant for each of these gradings. Individually, the Proposed Development exceeds the maximum scale of loss (20 ha) considered by the assessment criteria. Further cumulative losses due to the shortlisted developments would not increase the assessed magnitude of change in this regard. As stated in paragraph 10.10.6, to comply with the requirements of planning policy and standard industry good practice it is reasonable to assume that the shortlisted developments will be required to commit to following industry standard best practice measures and guidance (such as those set out in Defra's Code of Practice (Ref. 10-12)).

This will promote the sustainable reuse of soils, thereby ensuring that no downgrading of land quality will occur following reinstatement. It is also reasonable to assume that this will be secured through Planning Condition or DCO Requirement. Therefore, the magnitude of change from the baseline would be assessed as negligible (**Table 10-7**). The impacts due to the cumulative temporary losses of very highly sensitive Grade 2 and highly sensitive Subgrade 3a land are therefore assessed as minor adverse and not significant.

10.10.13 As set out in **Table 10-27** the impact of temporary losses of Subgrade 3b land due to the Proposed Development is assessed as negligible. Therefore, the Proposed Development cannot meaningfully contribute to any significant cumulative effect, and no assessment is provided.

10.11 Summary

10.11.1 The Study Area for the assessment of Agriculture and Soils comprises all land within the DCO Site Boundary excluding areas considered to be marine or intertidal which do not have the potential to contain soils or agricultural land. The Study Area therefore covers approximately 613.99 ha. The assessment is based upon a worst case in which all land within the Study Area is subject to construction activity and hence impacted by the Proposed Development. However it is noted that based upon an approximate 30 m corridor around the current preferred routing of the pipeline (referred to as the Proposed Working Area) just over a quarter of land (27.7 %) within the Study Area (169.95 ha) will be subject to development (see paragraphs 10.5.69 and 10.5.78).

10.11.2 In a change to the methodology presented at PEIR, the assessment methodology has been based upon IEMA's Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (2022) (Ref. 10-23) as this provides the only published guidance for the consideration of the impacts of development on soils and land in EIA.

10.11.3 Using published data, the approximate area of BMV land within the Study Area has been calculated. The majority of agricultural land within the Study Area is BMV quality comprising 76.54 ha of Grade 2 and 469.57 ha of Subgrade 3a. For context this equates to 0.13% of the total BMV land in Lincolnshire, 0.89 % of the total BMV land in North Lincolnshire, or 5.92 % of the total BMV land in North East Lincolnshire.

10.11.4 Although both BMV and non-BMV land would be directly impacted by the Proposed Development the majority of impacts will be temporary and for the duration of the construction phase only, as all land within the pipeline corridor, temporary compounds and temporary accesses will be reinstated immediately following construction to its original condition and land use. The residual impacts to agricultural land because of this temporary development are assessed as not significant.

10.11.5 Loss of agricultural land through above ground-built development or land use change is restricted to the Theddlethorpe Facility (Option 2) and its associated access, and the three Block Valve Stations. Although this land will be reinstated to agricultural use at decommissioning (long-term reversible change) for the purposes of the assessment the loss is considered permanent as a worst case. The loss of 2.7 ha of BMV Subgrade 3a land was assessed as not significant; however as using the criteria set out in the IEMA guidance results in a significant effect whenever permanent loss of Grade 1 or 2 land occurs, the loss of 0.2 ha of Grade 2 land to Block Valve Station 1 is assessed as significant.

10.11.6 The permanent loss of Subgrade 3a land could potentially be partially mitigated should Theddlethorpe Facility (Option 1) be chosen, as this facility and the access to it are existing hard standing with no potential impact to agricultural land. The loss of Grade 2 land cannot be mitigated as Block Valve Station 1 could not be moved out of the area Provisionally mapped as Grade 2. *Chapter 3: Description of the Proposed Development* of this *ES Volume II*, provides more detail on the required positioning / spacing of Block Valve Stations.

- 10.11.7 It is noted that the permanent loss of Grade 2 land equates to 0.0001% of Grade 2 land in Lincolnshire, 0.0005 % of Grade 2 land in North Lincolnshire, and 0.0055 % of Grade 2 land in North East Lincolnshire.
- 10.11.8 It is recognised within the IEMA guidance that some soils are more sensitive to damage when handled during construction than others. The methodology considers soils of high clay content in wetter climate regions to be most sensitive to damage. Of the 11 soil associations identified within the Study Area, three are of low sensitivity, seven are of medium sensitivity and one is of high sensitivity. The application of appropriate industry standard good practice measures for the sustainable management of soil resources (such as described in Section 10.8 and the Outline SMP included within *ES Volume IV: Appendix 10.1 (Application Document 6.4.10.1)*) will ensure the structure, function and resilience of the soil resource is maintained. Consequently, no significant residual effects to soil resources were identified.

10.12 References

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