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UK Onshore Scheme

Environmental Statement

Volume 2 Document ES-2-B.05

Chapter 09

Agriculture & Soils (Proposed Underground DC Cable)

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Environmental Statement Volume 2			
ES Reference	**Chapter**	**Chapter Title**	
ES-2-A.01	01	Introduction	
ES-2-A.02	02	Development of the UK Onshore Scheme (Alternatives)	
ES-2-A.03	03	Description of the UK Onshore Scheme	
ES-2-A.04	04	Environmental Impact Assessment Methods	
ES-2-B.01	05	The Proposed Underground DC Cable	
ES-2-B.02	06	Intertidal Zone	
ES-2-B.03	07	Geology & Hydrogeology	
ES-2-B.04	08	Water Resources & Hydrology	
ES-2-B.05	**09**	**Agriculture & Soils**	
ES-2-B.06	10	Ecology	
ES-2-B.07	11	Landscape & Visual Amenity	
ES-2-B.08	12	Archaeology & Cultural Heritage	
ES-2-B.09	13	Socio-economics & Tourism	
ES-2-B.10	14	Traffic & Transport	
ES-2-B.11	15	Noise & Vibration	
ES-2-B.13	16	Register of Mitigation	
ES-2-C.01	17	The Proposed Converter Station	
ES-2-C.02	18	Geology & Hydrogeology	
ES-2-C.03	19	Water Resources & Hydrology	
ES-2-C.04	20	Agriculture & Soils	
ES-2-C.05	21	Ecology	
ES-2-C.06	22	Landscape & Visual Amenity	
ES-2-C.07	23	Archaeology & Cultural Heritage	
ES-2-C.08	24	Socio-economics & Tourism	
ES-2-C.09	25	Traffic & Transport	
ES-2-C.10	26	Noise & Vibration	
ES-2-C.11	27	Register of Mitigation	
ES-2-D.01	28	Cumulative Effects	
ES-2-D.02	29	Summary of Assessment and Conclusions	

Contents

List of Tables

List of Figures

The following figures are referenced within this chapter and can be found in Volume 3 Part B Figures (ES-3-B.01).

List of Appendices

The following appendices are referenced within this chapter and can be found in Volume 4 Part B Technical Appendices (ES-4-B.05).

Glossary & Abbreviations

Glossary of Terms	
Term	**Meaning**
Agricultural Land Classification (ALC)	Agricultural Land Classification (ALC) is a standardised method for classifying the quality of agricultural land according to its versatility, productivity and workability, based upon inter-related parameters including climate, relief, soil characteristics and drainage. 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's (MAFF) 'Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land, 1988" (Ref: 9-1)
Agri-Environment Schemes (AES)	Agri-Environment Schemes (AES) are administered by the Department for Environment, Food and Rural Affairs (DEFRA), and can be adapted to particular farming systems and specific environmental conditions. This makes AES a targeted tool for achieving environmental goals. Examples of commitments covered by AES include: • Environmentally favourable farming; • Management of low-intensity pasture systems; • Integrated farm management and organic agriculture; • Preservation of landscapes and historical features such as hedgerows, ditches and woods; and • Conservation of high-value habitats and their associated biodiversity. AES therefore allow landowners; other individuals; and bodies responsible for land management to be incentivised (remunerated) to manage their land for environment benefit. Currently operational AES in England include, but are not limited to, Environmental Stewardship and Countryside Stewardship schemes. Environmental Stewardship schemes including Entry Level Stewardship (ELS); Higher Level Stewardship (HLS); Uplands ELS; Organic ELS; and Organic HLS were closed to new applicants in 2015; although existing agreements will continue to be managed until they reach their agreed end date. Since 2015, all new applications for environmental land management grants are subject to Countryside Stewardship schemes which comprise three main elements Mid-Tier schemes, Higher Tier schemes and Capital Grants. Higher and Mid-Tier schemes are multi-year agreements and both may include organic land. The difference between Higher and Mid-tier schemes is that Higher Tier schemes incorporate environmentally significant sites, commons and

Glossary of Terms	
Term	**Meaning**
	woodlands which require complex management and support from Natural England or the Forestry Commission. As the only difference between the tiers is due to the scale and management regime, they are considered equally within the assessment. Capital Grants are not considered in the assessment as they are specific to outcomes for hedgerows and boundaries, developing implementation plans, feasibility studies, woodland management plans, woodland creation (establishment), and tree health.
base scheme design	The design of the UK Onshore Scheme for the purposes of the planning application.
Best and Most Versatile (BMV) Agricultural Land	The National Planning Policy Framework (Department for Communities and Local Government, 2012) defines best and most versatile (BMV) land as land of excellent (ALC Grade 1), very good (Grade 2) and good (Subgrade 3a) agricultural quality (Ref: 9-2). 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.
converter station	Facility containing specialist equipment (some indoors and some potentially outdoors) for the purposes of converting electricity from AC to DC or DC to AC.
detailed scheme design	The design of the Scheme developed by the Contractor within the Limits of Deviation (AC and DC cables) and Rochdale Envelope (converter station).
DC cable route	The proposed route comprising DC and fibre optic cables from the landfall to the converter station.
Field Capacity	The water content of soil after is has been saturated in the field and excess water has drained away (usually 48 hours following a rainfall event). The soil is fully saturated and has no capacity to absorb additional water, consequently the soil moisture deficit is zero.
Field Capacity Days (FCD)	The median number of days at which the soil moisture deficit is at field capacity.
landfall	The area between Mean Low Water Springs and Mean High Water Springs where the Onshore and Offshore Schemes meet.
Limits of Deviation	These define the maximum extents of the corridor for which planning permission is sought and within which proposed DC and AC cable routes may be installed.
the Scheme	UK Onshore Scheme from MLWS to the connection point comprising underground AC and DC cables, converter station and access road.
Temporary Construction Compound	Compound used by the Contractor for siting of offices, welfare facilities, storage and laydown.
Temporary Works Area	Larger working area located on or adjacent to the working width used where construction activities requires a larger area for example at trenchless crossings.
working width (DC cables)	The 30 m wide working corridor required for the installation of underground DC

Glossary of Terms	
Term	**Meaning**
	cables.

List of Abbreviations	
Abbreviation	**Meaning**
AC	Alternating Current
AES	Agri-Environment Scheme
ALC	Agricultural Land Classification
BBC	Boston Borough Council
BMV	Best and Most Versatile (agricultural land)
BPS	Basic Payment Scheme
CLA	Country Landowners Association
CLC	City of Lincoln Council
COA	Cable Offload Area
CS	Converter Station
DC	Direct Current
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DTS	Distributed Temperature Sensing
ELDC	East Lindsey District Council
ELS	Entry Level Stewardship
EHLS	Entry Level plus Higher Level Stewardship
ES	Environmental Statement
FCD	Field Capacity Days
ha	Hectare
HDD	Horizontal Directional Drilling
HLS	Higher Level Stewardship
HVDC	High Voltage Direct Current
IPC	Infrastructure Planning Commission
LAAV	Lincolnshire Association of Agricultural Valuers
LDC	Agricultural Land Drainage Consultant
LCC	Lincolnshire County Council
LoD	Limits of Deviation

List of Abbreviations	
Abbreviation	**Meaning**
LPA	Local Planning Authority
LWS	Local Wildlife Site
LWT	Lincolnshire Wildlife Trust
MAFF	Ministry of Agriculture, Fisheries and Food (now DEFRA)
NE	Natural England
NFU	National Farmers' Union
NKDC	North Kesteven District Council
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
OEHLS	Organic Entry Level plus Higher Level Stewardship
SHDC	South Holland District Council
SHSP	Soil Handling and Storage Protocol
TCC	Temporary Construction Compounds
TWA	Temporary Works Areas
UGC	Underground Cable
WLDC	West Lindsey District Council
ZoI	Zone of Influence

1 Introduction

1.1 Introduction

1.1.1 This chapter has been prepared by Wardell Armstrong LLP. It reports the results of baseline studies and the assessment of the potential environmental impacts of the proposed Direct Current (DC) cable route on Agriculture & Soils. Table 9.1 below sets out the structure of the Environmental Statement (ES) with respect to Agriculture and Soils. Reference should be made to other documents which form part of the ES as appropriate.

1.1.2 Impacts on Agriculture & Soils are interrelated with impacts on ecology (ES-2-B-06, Volume 2, Chapter 10, Ecology) and water resources (ES-2-B-04, Volume 2, Chapter 08, Water Resources and Hydrology), respectively. The potential cumulative effects are discussed in Chapter 28 (ES-2-D.01, Cumulative Effects).

Table 9.1: Environmental Statement: Agriculture & Soils

ES Reference	ES Volume	ES Chapter	Content
ES-2-B.05	**2**	**09**	**Main Report: Proposed Underground DC Cable**
ES-2-C.04	2	20	Main Report: Proposed Converter Station
ES-3-B.01	3	09	Figures: Proposed Underground DC Cable
ES-3-C.01	3	20	Figures: Proposed Converter Station
ES-4-B.05	4	09	Technical Appendices: Proposed Underground DC Cable
ES-4-C.04	4	20	Technical Appendices: Proposed Converter Station

1.2 Chapter Structure

1.2.1 The remainder of this chapter is structured as follows:

- Section 2. Approach to Assessment. Sets out the approach or methodology employed in the assessment.
- Section 3. Basis of Assessment. Sets out the key assumptions which have been made in undertaking the impact assessment.
- Section 4. Planning Policy and Legislative Considerations. Summarises the key points of planning policy and legislation which have been considered as part of the assessment.
- Section 5. Baseline Conditions. Reports the results of desktop and field studies undertaken to establish existing conditions.

- Section 6. Potential Impacts. Identifies the potential impacts on agriculture & soils which may occur as result of construction and operation.
- Section 7. Mitigation. Identifies the mitigation which is proposed including measures which are incorporated into the siting, design and construction of the proposed underground HVDC cable.
- Section 8. Residual Effects. Reports the residual effects which remain, taking into account the proposed mitigation, and identifies whether these are significant or not.
- Section 9. Cumulative Effects. Identifies the inter-project cumulative effects which may occur in combination with other developments.
- Section 10. Summary of Assessment. Provides a summary of the key findings of the impact assessment.
- Section 11. References

2 Approach to Assessment

2.1 Introduction

2.1.1 The approach to assessment describes the approach to the identification and assessment of impacts resulting from the construction and operation of the proposed DC cable route on Agriculture and Soils.

2.2 Summary of Consultation

Scoping Opinion Review

2.2.1 Table 9.2 summarises the issues raised in the scoping opinion in relation to Agriculture and Soils, and outlines how these has been addressed. A copy of the scoping opinion is included in Appendix 4.

Table 9.2: Scoping Opinion (Agriculture & Soils)

Consultee	Summary of Comment	How and where addressed
Boston Borough Council (BBC)	BBC requested the advice provided by Natural England (NE) is followed and fully taken account of in the final chapter.	The NE response is presented in Appendix 9.2. The assessment methodology has been presented to and agreed by NE.
East Lindsay County District Council (ELDC)	ELDC refer to Lincolnshire County Council's (LCC) response that a detailed ALC survey and Soil Management Plan should be submitted to support the application and incorporated in the ES. ELDC also highlighted Lincolnshire Wildlife Trust's (LWT's) concerns regarding certain aspects of the proposed mitigation.	1. Please refer to the NE response (Appendix 9.2), whereby a detailed ALC survey is not required for production of the ES. 2. Measures to protect soils are set out in a Soil Handling and Storage Protocol (SHSP, Ref: 9-3), based on best practice guidance such as Defra's Construction Code of Practice (Ref: 9-4). 3. Refer to the LWT response.
Lincolnshire County Council (LCC)	ELDC also highlighted LWT's concerns regarding certain aspects of the proposed mitigation.	Refer to the ELDC response.
LWT (Lincolnshire Wildlife Trust)	LWT highlighted concerns regarding a preference to route through pasture land as opposed to arable land, but recognised that the	From an agricultural point of view, pasture land is considered to be of lower sensitivity to development than the high value arable land in the locality. During construction

Table 9.2: Scoping Opinion (Agriculture & Soils)		
Consultee	**Summary of Comment**	**How and where addressed**
	proposed route would take account of a range of environmental considerations.	activities, the undisturbed pasture land outside of the working width can remain *in-situ*/in use, however, due to the requirement for large agricultural equipment this is not often possible for arable land. Appropriate mitigation measures would be in place to ensure that soils were correctly handled and stored to minimise loss of soil function. However, the iterative design process and consequent final routeing considers the potential impacts identified by all disciplines, including ecology.
Natural England (NE)	NE highlighted the requirement to consider the Government's policy for the protection of the BMV agricultural land as set out in paragraph 112 of the NPPF. NE also recommend that soils should be considered under a more general heading of sustainable use of land and the ecosystem services they provide as a natural resource in line with paragraph 109 of the NPPF, with a focus on the protection and sustainable use of soil resources, and details of how any adverse impacts on soils can be minimised. NE requested a detailed survey (on areas of permanent land take) to enable the consideration of the degree to which soils are going to be disturbed/harmed as part of this development and whether BMV agricultural land is involved.	Government policy has been carefully reviewed and the 'need to protect BMV land' has been considered within the assessment and throughout the iterative design process. The assessment and the mitigation measures set out in the SHSP will ensure that the structure and function of soil resources (hence their ability to provide essential ecosystem services) are protected (Ref: 9-3). However, this is not presented as a separate heading. Detailed soil survey and ALC has been undertaken on areas of permanent land take. For areas of temporary land take, a desk based methodology has been agreed with NE (see Appendix 9.1).
South Holland District Council (SHDC)	SHDC requested the advice provided by NE is followed and fully taken account of in the final chapter.	Please refer to the NE response (Appendix 9.2).

2.3 Additional Consultation

2.3.1 Table 9.3: summarises additional consultation undertaken with relevant statutory and non-statutory consultees in relation to Agriculture and Soils, and outlines how and where this has been addressed within the assessment.

Table 9.3: Additional Consultation (Agriculture & Soils)

Consultee	Nature of additional consultation	How and where addressed
Country Landowner's Association (CLA)	NGVL held a meeting with the CLA's rural surveyor in in October 2016. The CLA stated that matters should be resolved to the satisfaction of the NFU and that they would liaise with the NFU also.	See NFU response.
Lincolnshire Association of Agricultural Valuers (LAAV)	High-level project update meetings were held between NGVL and a panel of three representatives of the LAAV in September 2016. The meetings investigated lessons learned from Triton Knoll and other utilities projects; and key landowner concerns (principally agricultural land drainage issues) and outlined how these would be addressed. A further meeting with LAAV, NFU, the appointed land drainage consultant (LDC) and NGVL was held on 3rd May 2017. This was principally to discuss land drainage design, cable burial depths, Option and Easement agreements and legal issues.	Representative of specialist disciplines, including Agriculture and Soils, attended the Triton Knoll planning hearings to identify specific areas of concern and ensure that these were adequately addressed by the UK Onshore Scheme. A specialist land drainage contractor (LDC)), has been engaged to undertake pre- and post-construction agricultural land drainage design, which will be submitted as part of the supporting information to the planning application. Feedback from LAAV has be considered during the design process.

Table 9.3: Additional Consultation (Agriculture & Soils)		
Consultee	**Nature of additional consultation**	**How and where addressed**
National Farmers' Union (NFU)	An 'introduction of personnel' meeting between the NG project management team and the NFU was held on 12 January 2016. A further project introduction meeting was held on 26 April 2016 which discussed the justification for connecting to Bicker Fen rather than South Humber; contact with LAAV; issues concerning drainage; and stakeholder engagement. An initial high-level consultation meeting between NGVL and two NFU representatives was held on 13 January 2017. NGVL presented a project update; and the meeting addressed key landowner concerns (principally agricultural land drainage issues) and outlined how these would be addressed. A meeting with LAAV, NFU, LDC and NGVL was held on 3 May 2017 – see LAAV response (Table 9.2). This was principally to discuss land drainage design, cable burial depths, Option and Easement agreements and legal issues.	Consultation with LAAV has been undertaken (see above). A programme of stakeholder engagement and public consultation is in place. A specialist contractor, LDC, has been engaged to undertake pre- and post-construction agricultural land drainage design, which will be submitted as part of the supporting information to the planning application. Feedback from NFU has be considered during the design process.
NE	Consultation between Wardell Armstrong, NGVL and NE took place between July 2016 and March 2017 (Appendix 9.2) to determine the methodology for the determination of BMV land within the UK Onshore Scheme.	The detailed methodology, as agreed with NE, is for detailed soil survey to be undertaken in areas of permanent development, and for a desk based approach to be adopted in areas of temporary development. The methodology is fully described in Appendix 9.1; and consultation with NE is presented in Appendix 9.2.

2.4 Scope of Assessment

Aspects to be assessed

2.4.1 The following aspects will be assessed:

- Loss of agricultural land;
- Loss of soil resources;
- Damage or disturbance to soil resources; and
- Loss of eligibility for AES.

2.4.2 The terminology used throughout the Agriculture and Soils assessment is presented in the glossary of terms at the start of this chapter, along with a list of abbreviations.

Spatial Scope

2.4.3 The discipline specific spatial scope of the Agriculture and Soils assessment is the Zone of Influence (ZoI) as illustrated in Figure 9.1. The ZoI (planning application boundary) covers an area of approximately 720 ha, which is split in to four Route Sections, as discussed in Paragraph 5.2.7 and illustrated in Figure 9.1.

Temporal Scope

2.4.4 Temporary impacts to Agriculture and Soils due to the proposed DC cable, include the temporary disturbance of soil resources; and the temporary removal of land from agricultural use and AES eligibility. There is also the potential for temporary impacts to arise during maintenance operations.

2.4.5 Longer term and permanent effects to Agriculture and Soils are those which would occur as a result of the construction of the proposed DC cable (which may begin during construction and endure for the lifetime of the Scheme) and result in permanent land take. These do not occur within the proposed the DC cable route, and are therefore not considered further. Longer-term impacts may arise from maintenance or remedial works required for the DC cable route.

2.5 Changes to Proposed Scope

2.5.1 There have been some changes to the proposed scope of assessment presented in the Scoping Report (Appendix 4). These changes provide an adapted methodology for the assessment to make best use of the available data and better reflect the available guidance.

2.5.2 The assessment criteria have been refined, removing needed the ‘very high’ sensitivity level such that the assessment criteria are in accordance with criteria in other chapters of the ES.

2.5.3 The determination of significance for the loss of agricultural land is no longer assessed using the criteria tables as presented in the Scoping Chapter. This is due to the criteria stating that the permanent loss of BMV land exceeding 20 ha is considered significant. As a result, any loss of

BMV agricultural land which is temporary or falls below the 20 ha threshold is considered as being not significant.

2.5.4 The assessment of soil resource has been sub divided, which has allowed potential impacts resulting from the disturbance of the soil resource to be assessed separately from the potential loss of soil resource.

2.5.5 The approach to the methodology used to assess AES in relation to the magnitude of change from the baseline has been altered. Due to the nature of AES, they can either be in place, or not. As a result, there are three levels of impact magnitude; a permanent loss of eligibility to existing schemes (i.e. on schemes which hare currently in place) due to placement of permanent infrastructure (high magnitude); a temporary loss of eligibility due to temporary works in which the land would be re-eligible for the AES following the construction phase (low magnitude), and no impact on AES (negligible magnitude). The assessment was carried out on AES in place as identified on 17 May 2017.

2.5.6 The environmental impacts to land holding are no longer assessed for the DC cable route, as the agricultural land take will only be temporary.

2.6 Identification of Baseline Conditions

Desk Studies and Assessment Guidance

2.6.1 The published sources of data listed in Table 9.4 have been reviewed, these represent the most current datasets regarding agricultural land quality, soil resource and enrolment in an AES within the ZoI. They have been used to inform the baseline presented in Section 5 of this chapter (Baseline Conditions).

Table 9.4: Sources of Data (Agriculture & Soils)

Source	Data	Reference
Knox *et al.,* (2015)	Research to develop the evidence base on soil erosion and water use in agriculture	Ref: 9-5
National Soil Resources Institute (NSRI)	LandIS soils data (1:250,000 scale National Soil Map, digital dataset including NATMAPvector and associated datasets)	Ref: 9-6
Ministry of Agriculture, Fisheries and Food (MAFF)	Provisional Agricultural Land Classification Sheet, Eastern Region (1:250,000 scale)	Ref: 9-7
Soil Survey of England and Wales	Soils and their Use in Eastern England and accompanying 1:250,000 map: Sheet 4: Eastern England"	Ref: 9-8
Met Office	Climatological Data for Agricultural Land Classification	Ref: 9-9
DEFRA	Agri-Environment Schemes identified using MagicMap	Ref: 9-10

Table 9.4: Sources of Data (Agriculture & Soils)		
Source	**Data**	**Reference**
Natural England	Strategic 1:250,000 scale Predictive 'Likelihood of best and most versatile land' mapping	Ref: 9-11

2.6.2 Where relevant, the impact assessment also utilises from specific liaison and consultation, for example data gathered by NGVL.

2.6.3 It has been agreed with NE (Appendix 9.2) that as there is no permanent land take as a consequence of the proposed DC cable route, the Agriculture and Soils baseline can be assessed using desk-based data and analysis as described in paragraphs 2.6.4 to 2.6.7 and Appendix 9.1, with the understanding that 'prior to works commencing soil surveys would be required in order to produce a detailed SHSP' (see Appendix 9.2).

2.6.4 The 1:250,000 scale Provisional ALC mapping for the Eastern Region (Ref: 9-7) is the most current and detailed published ALC data covering the ZoI (see Appendix 9.1,). However, it is important to note that this data pre-dates the revised ALC methodology issued in 1988 (Ref: 9-1), and as a result, the data does not provide a distinction between ALC Subgrades 3a and 3b. The Provisional ALC mapping therefore provides an indicative indication of the land quality in the Region, but the extent and distribution of BMV agricultural land within the ZoI and proposed DC cable working width cannot be defined from the Provisional mapping alone.

2.6.5 Therefore, as described in Table 9.3 and shown in Appendix 9.2, it has been agreed with NE that estimates of Subgrade 3a and 3b within the proposed DC cable working width, temporary construction facilities and wider ZoI can be determined using purchased LandIS soils data (Ref: 9-6); and the calculated proportion of Subgrade 3a and 3b of each series combined with the mapped ALC Grades 1 and 2 land used to quantify the area of BMV land that would be temporarily lost. The results of the desk based determination of Subgrade 3a and 3b is summarised in (Table 9.1.2 of Appendix 9.1). These data have subsequently been verified against NE's strategic 1:250,000 scale Predictive 'Likelihood of best and most versatile land' mapping (Ref: 9-11), and the methodology is fully described in Appendix 9.1 (ES-4-B.05).

2.6.6 The verification exercise revealed that for the majority of the thirteen Soil Associations identified on ALC Grade 3 land within the ZoI, the WA desk based approach agreed with the likelihood of BMV categories as identified by NE. The estimations of the proportion of Subgrade 3a (BMV land) in the Andover, Cuckney 2 and Blackwood associations determined in the desk based assessment were more conservative than those identified in NE's strategic Predictive mapping. Therefore, the Subgrade 3a and 3b estimates determined in the desk based assessment were used in the impact assessment. Whereas the estimations of the proportion of Subgrade 3a and 3b in the Wallasea 2 association determined in the desk based assessment was less conservative than those identified in NE's strategic Predictive mapping, with the desk study showing no BMV land would be present (Table 9.1.1 in Appendix 9.1). Therefore, to present a

conservative assessment, the NE data (Wallasea 2; Subgrade 3a, BMV) has been adopted in the impact assessment.

2.6.7 Predictions of subgrade have been used to ensure that the assessment takes into account all land with the potential to be Subgrade 3a. Throughout the assessment, the most conservative estimate of Subgrade 3a is used to present a worst-case scenario. This includes the use of the desk-based assessment results for all of the Soil Associations with the exception of Wallasea 2, in which the NE strategic Predictive mapping assessment is used.

2.6.8 The Climate Grade is calculated in a grid across the ZoI using the Meteorological Office data on a 5km grid basis (Ref: 9-9). This is used to determine the Field Capacity Days (FCD) in each grid box, which would impact the Wetness Grade of the identified Soil Associations depending on the location along the proposed DC cable route.

Field Studies

2.6.9 Owing to the sensitive nature of the agricultural land and the reliance on complex systems of agricultural land drainage along the proposed DC cable route, pre-and post-construction agricultural drainage design works has been undertaken to inform the design of the Scheme.

2.6.10 LDC has confirmed that, where access could be agreed, the soil survey was taken out in accordance with the standard procedures set out in NE's Technical Information Note 049, 'Agricultural Land Classification: protecting the Best and Most Versatile agricultural land' (Ref: 9-12). The survey methodology and the density of sampling varied slightly along the route, however, in general, samples were undertaken at a density of approximately one sample every 100 m (linear) along the proposed working width (as identified at time of commission), with a minimum of one sample per agricultural field, avoiding areas of non-agricultural land, forestry etc. The survey was aligned to a 30 m corridor, representing the proposed working width identified in Route revision P4 dated 16th June 2016, therefore design changes between the commissioning of the surveys and the final routeing being agreed may have resulted in the survey area being either within the preferred working width or ZoI or not, therefore additional soil surveys may be required prior to construction.

2.6.11 Although there will be no permanent development along the proposed DC cable route, consultation with NE (Table 9.3), also stated that soil surveys are required in areas identified as comprising high and medium sensitivity soils (i.e. soils with high organic matter content or which are prone to wind and/or water erosion, as per Ref: 9-6), as these may require additional mitigation measures beyond those set out in standard guidance documents.

2.6.12 The LandIS dataset and the erodibility of Soil Associations (Ref: 9-6 and Ref: 9-5) were used to identify potential areas of increased soil sensitivity; and through informed design during the iterative design process of the DC cable route, most areas of high sensitivity were avoided. However, some high and medium sensitivity soils occur within the northern section of the proposed DC cable route between East Kirkby in the south to Haugh in the north. These could

not be avoided either due to their large geographic distribution and/or the constraints posed by other disciplines. Again, it is expected that a review of the LDC data, when available, will allow the further identification of the presence and extent of these soils of high and medium sensitivity; which will allow targeted mitigation to be implemented.

2.6.13 An outline SHSP accompanies the planning application (Ref: 9-3), this document sets out good practice soil protection measures and the basis for how works will be undertaken. The detailed measures however, will be finalised by the Contractor taking in to account the detailed Scheme design and pre-construction site-specific soil data.

2.7 Assessment Criteria

Sensitivity of Receptors

2.7.1 The sensitivity of receptors will be assessed in accordance with the definitions in Table 9.5.

Table 9.5: Sensitivity Criteria (Agriculture & Soils)

Receptor	Sensitivity	Justification
Soil Resource & AES participation.		
Soils with high risk of erosion and organic soils (peat). Land under Organic AES	High	Development on those soils should be avoided, however if this is not possible, they require bespoke consideration and site-specific planning of construction methods, e.g. use of temporary working surfaces, careful storage, protection from drying out, in order to preserve their functions. High importance as a carbon store and active role in carbon sequestration, which have little capacity to tolerate change. Increased mitigation requirements beyond standard measures are required for organically managed land.
Soils with moderate risk of erosion. Land under High Level AES	Medium	Standard mitigation measures would provide appropriate protection to these soils, however damage is likely to occur if worked in less than ideal conditions, e.g. when above their plastic limit. The soils should be given appropriate consideration because of their importance for agricultural production. Standard mitigation measures would provide appropriate protection to land under these AES schemes.

Table 9.5: Sensitivity Criteria (Agriculture & Soils)		
Receptor	**Sensitivity**	**Justification**
Soils with low risk of erosion. Land under Entry Level AES (e.g. BPS); Higher- or Mid-Tier Countryside Stewardship Schemes	Low	These soils are generally more resistant to damage (except peat soils). Standard mitigation measures will provide appropriate protection to land under these AES.
Poor quality soils within an urban environment not supporting biodiverse habitats. Soils with no risk of erosion. Land not under an AES.	Negligible	These soils are already highly disturbed and of poor quality. Only basic mitigation measures are required.

2.7.2 Soil erodibility is a measure of the susceptibility of soils to loss both *in-situ* (i.e. as an undisturbed soil profile) and during soil stockpiling, due to wind or water erosion (natural erosion potential). Soil erodibility is considered in the rating of soil sensitivity, with the sensitivity classification of the different soils encountered based upon data compiled by Knox *et al.* (Ref: 9-5). Therefore, as a general rule, heavy (clay rich) soils are classified as low sensitivity (low soil erodibility), whilst light sandy soils are classified as high sensitivity (high soil erodibility).

2.7.3 However, it is important to note that soils of differing texture and structural development may be subject to a range of potential impacts during and following reinstatement. 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 a reduced natural drainage compared to the natural soil profile and a subsequent increased risk of soil loss (erosion) due to surface water run-off. Whereas, the permeable nature of light sandy soils means that the natural structural recovery and drainage potential of the soils is more easily maintained upon reinstatement. However, as appropriate mitigation measures, such as the good practice set out in the SHSP and Section 7, will mitigate against any potential adverse impacts during reinstatement regardless of the soil texture or prevailing structure, only soil erodibility (i.e. the sensitivity of the undisturbed soil profile or soil stockpiles) is considered in the sensitivity criteria of the soil assessment.

Magnitude of Impacts

2.7.4 The magnitude of impacts has been assessed in terms of the change from baseline conditions, as defined in Table 9.6.

Loss of Agricultural Land (Agricultural Land Quality and Land Use)

2.7.5 BMV agricultural land (Grade 1, 2, and Subgrade 3a) is considered to be a finite national resource and is given special consideration under the NPPF (Ref: 9-2). However, there are no defined criteria for the assessment of effects on agricultural land (understood as a permanent land use change to a built development), and no threshold given for BMV loss (permanent land use change) which should be regarded as significant within an Environmental Impact Assessment (EIA).

2.7.6 Statutory Instrument 2015 No. 595, The Town and Country Planning (Development Management Procedure) (England) Order 2015, Schedule 4, Part (y), requires that the local planning authority consults NE if the area of a proposed permanent development exceeds 20 ha of BMV land (Ref: 9-13). Although the guidance does not state that this threshold should be used to determine the significance of loss, for the purpose of EIA, it is a guide to consider significance where 20 ha or more of BMV is affected by a development. To determine the level of significance, other factors are considered, including whether the development is temporary or permanent and the extent of BMV in the locality.

2.7.7 Therefore, the loss of agricultural land has been assessed by estimating the amount and quality of land that may be affected by the DC cable, with a threshold of 20 ha of permanent BMV loss used to determine whether the loss is significant or not. Magnitude of effect and receptor sensitivity classifications are not assigned. Rather, any permanent BMV loss that exceeds 20 ha is assessed as significant, whilst any that is temporary or occupies less than 20 ha is assessed as not- significant.

2.7.8 The majority of agricultural land within the Planning Application Boundary (see Figure 9.1) is productive arable land, the majority of which is ALC Grade 2 and 3 (Ref: 9-7), which is typical for Lincolnshire. Therefore, in this assessment, it can be assumed that agricultural land use is closely related to agricultural land quality, with arable and horticultural land tending to be more prevalent within areas graded as BMV, land under mixed rotation on good to moderate quality land, and pasture land located on areas of lower quality. Current land use is therefore reflected in the ALC assessment.

Soil Resources

2.7.9 There are no defined criteria, or policy guidance on the assessment of the effects of development on soil resources. Therefore, the assessment of the effect of permanent and temporary development as a consequence of the DC route has been assessed in terms of the identified soil resources, their sensitivity to disturbance and the degree of loss of soil resource.

2.7.10 The disturbance of soil resources has been assessed by reporting the sensitivity of soil resources to damage. The sensitivity criteria for disturbance of soil resources are based on the erodibility of soils (see paragraphs 0 and 2.7.3) or ecologically important soils, such as peat. The soil resource assessment considers both temporary and permanent damage. The receptor sensitivity

criteria are provided in Table 9.5. The magnitude of change from the baseline is defined in terms of the damage to soil resource as provided in Table 9.6

2.7.11 The soil loss assessment considers the permanent loss of the soil resource due to the DC route. The receptor sensitivity criteria are provided in Table 9.5. The magnitude of change from the baseline has been defined in terms of the potential loss of soil resources, as provided in Table 9.6.

2.7.12 As discussed in Paragraph 2.7.3, the vulnerability of soils to damage due to their texture and structural development is minimised through the implementation of standard good practice as set out in the SHSP and Section 7.

Agri-Environment Schemes (AES)

2.7.13 There are no defined criteria, or policy guidance on the assessment of the effects of developing land enrolled in an AES. Therefore, the assessment of the effect of the proposed DC cable route has been assessed in terms of the permanent or temporary change of eligibility of the landholding for AES. The receptor sensitivity criteria are provided in Table 9.5. The magnitude of change from the baseline has been defined in terms of the change of eligibility of the land for AES as provided in Table 9.6.

2.7.14 Due to the nature of AES, they can either be in place, or not, as a result, there are three levels of impact magnitude; a permanent loss of eligibility due to permanent infrastructure (high magnitude); a temporary loss of eligibility due to temporary works in which the land would be eligible for the AES following the construction phase (low magnitude), and no impact on the AES (negligible magnitude).

2.7.15 It should be noted that AES are designed to provide areas of ecological enhancement and therefore some of the AES considered in this chapter may also contain features which are considered to be ecological constraints, for example species diverse hedgerows. This chapter focuses on the impacts of the DC route in terms of changes in AES eligibility and does not consider the ecological or economic implications of the schemes. Specific ecological and economic issues are addressed in Chapter 10 Ecology (ES-2-B.06), and Chapter 13 Socio-Economics and Tourism (ES-2-B.09).

Table 9.6: Impact Magnitude Criteria (Agriculture & Soils)

Magnitude	Damage to Soil Resource	Loss of Soil Resource	AES
High	Permanent irreversible or long-term (more than 2 years), reversible damage to soil quality through handling, and stockpiling.	<25% of soil resources suitable for reuse and retained on site	Permanent change to land holding AES eligibility

Table 9.6: Impact Magnitude Criteria (Agriculture & Soils)			
Magnitude	**Damage to Soil Resource**	**Loss of Soil Resource**	**AES**
Medium	Medium-term (6 months to 2 years) temporary disturbance Reversible damage to soil quality through handling, stockpiling, machinery traffic, *etc.*	25-50% of soil resources suitable for reuse and retained on site	Not applicable
Low	Short-term (<6 months) disturbance of soil resources. Reversible damage to soil quality through handling, stockpiling, machinery traffic, *etc.*	51-95% of soil resources suitable for reuse and retained on site	Temporary change to land holding AES eligibility
Negligible	No damage or very small scale surface damage equivalent to that done by a typical farm machinery traffic	>95% of soil resources suitable for reuse and retained on site	No change to AES eligibility

Assessing the Significance of Effects

2.7.16 For all effects except the loss of agricultural land, the level of significance of effects has been assessed using Table 9.7. Where effects are determined as Major or Moderate Adverse, the effect is considered 'significant'. Where effects are determined as Minor Adverse or Negligible, the effect is 'not significant'.

Table 9.7: Assessment of Significance (Agriculture & Soils)				
Magnitude of Impact	**Sensitivity of Receptor**			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

2.7.17 The assessment of the loss of agricultural land does not take into account temporary land use change, as this land would be returned to agricultural use once construction is complete. Within the loss of agricultural land assessment, the areas of temporary land use change are reported for illustrative purposes only. Temporary land use change is considered implicitly in the assessment of effects in relation to loss of, and damage to, soil resources and AES eligibility; in that mitigation

to ensure maintenance of soil volume and quality, will also ensure that the soil profile and thereby the quality of land is restored to the pre-commencement condition, allowing AES eligibility to be maintained.

3 Basis of Assessment

3.1 Design Mitigation

3.1.1 Design mitigation are those measures which have been incorporated into the base scheme design of the proposed DC cable route. Through the iterative design process, all alternative route corridors and alternative DC cable route alignments have been assessed in terms of the potential impacts to agriculture, soils and AES. Therefore, within the limits of constraints presented by engineering and other environmental disciplines, high sensitivity agricultural receptors have been avoided where possible.

3.1.2 The design mitigation therefore has minimised impacts to AES by avoiding high level and organic schemes as far as practicable; prevented impacts to high sensitivity peat soils and minimised impacts to other sensitive soil types through avoidance.

3.2 Assessment Assumptions

3.2.1 The assessment of the impacts of the DC route is based on published ALC and soils data, including; the Provisional ALC mapping (Ref: 9-7), the LandIS NATMAP dataset (Ref: 9-6) and “Soils and their use in Eastern England” (Ref: 9-8), further described in paragraphs 2.6.4 and 2.6.5; and Appendix 9.1. This assessment approach has been agreed with NE (see Appendix 9.2) and the assessed ALC has been verified against NE’s strategic Predictive BMV mapping (Ref: 9-11). The justification for this approach for the proposed DC cable route assessment, is that the land use change (loss of agricultural land) and soil disturbance associated with the DC cable would be temporary, restricted to the construction period of the DC cable only. Therefore, the level of detail is commensurate with the geographical and temporal extent of the DC cable and the likely scale of the effects.

3.2.2 If the calculation of the ALC grade from the published data results in a Grade other than 3a or 3b, the Grade would be corrected. For example, a calculated Grade 1 or 2 would remain BMV land, but re-assigned to Subgrade 3a, whilst a calculated Grade 4 or 5 would remain non-BMV, but re-assigned to Subgrade 3b. Where it is not possible to determine one single grade for a soil series, equal proportions would be assumed.

3.2.3 While it is possible that the ALC grade or Soil Association derived from this data does not reflect the grade in a particular location within a field, it does reflect dominant land quality or soil characteristics and provides an average for a larger area. Therefore, it allows for the assessment of effects for loss of agricultural land and damage to soil resources at a scale appropriate to assess both the permanent loss of agricultural land and the effect of temporary disturbance on soils in agricultural use.

3.2.4 However, the spatial arrangement of the ALC Grading cannot be obtained from the Landis NATMAP data, as only the proportion of each soil series within an association is provided, not their geographical location. Therefore, the relative proportions of Subgrade 3a and 3b within the proposed DC cable route and wider ZoI can only be presented in a tabular form and not represented in a mapped format (Table 9.1; Appendix 9.1). Consequently, Figure 9.1 represents ALC grading along proposed DC cable route, but does not provide a subdivision of Grade 3.

3.2.5 The assessment of effects to soil resources through loss and/or damage is based on Soil Association and component soil series characteristics derived from the Landis NATMAP dataset; and soil erodibility data derived from Knox et al., 2015 (Ref: 9-6 & Ref: 9-5, respectively).

3.2.6 The soil texture information is obtained from the published soil profile descriptions (Ref: 9-8). Where a soil texture is identified as 'heavy or medium' (i.e. silty clay loams and clay loams where texture can be either heavy or medium depending on the percentage clay content), it is assumed the distribution is a fifty-fifty split. Additionally, if more than one soil texture is listed in the description of soils series, their proportions would be assumed to be equal. Where soil Wetness Class can be improved via appropriate land management, it is assumed that appropriate management practices are in place, such as agricultural land drainage.

3.2.7 It is assumed that the period of temporary storage of excavated soils along the proposed DC cable route would vary, however, as stated in paragraph 3.3.6, it is assumed that cable installation would be undertaken in a phased manner so that sections of trench would not be left open, and soils would be stored for no longer than a year (Chapter 5; ES-2-B.01). Good management practices, i.e. embedded mitigation measures, include the use of best practice storage handling and reinstatement methods, such as seeding of the stockpiles if soils are stored for longer than 6 months, which would prevent irreversible damage to soil quality and enable effective restoration (Ref: 9-4 & Ref: 9-14).

3.2.8 It is assumed that excavated soils for the proposed DC cable working width, Temporary Works Areas (TWA), Temporary Construction Compounds (TCC) and Cable Offload Areas (COA), would be reinstated in situ (with negligible unavoidable loss due to mixture of track base aggregate or removal on wheels). Within the proposed DC cable working width, this is possible because the soil displaced by the cable would be added to the, much larger, amount of soil temporarily excavated for the working area and reinstated along the proposed DC route. Where excavations are to a depth where the quality/nature of the excavated material is not suitable for reuse as a subsoil material within the restoration soil profile as described above (i.e. excavations have gone deeper than the subsoil), the material is not considered to be a soil. This non-soil substrate would also be reinstated in situ where possible, any excess non-soil substrate would be removed from site and to a suitably licenced and managed facility.

3.2.9 The sensitivity of soils for the purpose of assessing the effects to soil resources through loss and/or damage has been determined. This will ensure best management practices (Ref: 9-4 & Ref: 9-14), together with any mitigation required, are implemented effectively.

3.2.10 An outline SHSP accompanies the application (document reference: VKL-08-39-G500-026), this document sets out the good practice soil protection measures to be used for the Project; and is based upon guidance such as Defra's Construction Code of Practice (Ref: 9-4) and MAFF's Good Practice Guide for Handling Soils (Ref: 9-14). Measures included in the SHSP include, but are not limited to, the control of construction plant movements to avoid operating on unprotected soils; minimisation of topsoil stripping areas to those essential to the works; protection of sensitive areas using specialist surfacing (e.g. geotextile membranes, wooden matting or aluminium trackways), and/or vehicles fitted with low ground pressure bearing pneumatic tyres; segregation of topsoil, subsoils and different superficial deposits and careful reinstatement in reverse excavation order; early reseeding of reinstated ground, to help re-establish and stabilise soil structure; topsoil and subsoil movements only undertaken in suitable weather conditions; soil loosening techniques such as deep tine cultivation and subsoiling, where required; and measures to minimise risks of erosion, leachate, silt and dust generation (e.g. soil stabilisation, storage of soils on impermeable sheeting, covering of stockpiles, runoff management, spraying or seeding).

3.2.11 The SHSP will consider the soil texture and structure and present the appropriate soil handling procedures and timings so to avoid damage to the soil due to handing in incorrect weather conditions. For example, the reinstatement of a heavy textured (high clay content) soil in wet conditions, may result in high levels of soil compaction compromising the soil's drainage properties and a subsequent increased risk of soil erosion due to increased levels of surface water run-off. The use of the appropriate mitigation measures such as the good practice set out in the SHSP and Section 7 will however, mitigate against any potential adverse impacts during soil handling regardless of the soil texture or prevailing structure.

3.2.12 Prior to commencement of construction, where required, site-specific soils data will be utilised to update the SHSP to a detailed document containing site-specific mitigation which will be implemented during construction activities.

3.3 Engineering assumptions

3.3.1 The proposed DC cable route consists of two DC cables and up to three fibre optic cables which will be installed in one trench, routed from the Proposed Landfall in East Lindsey to North Ing Drove in South Holland. A full description of the proposed DC cable route from the landfall to the converter station is provided in ES-2-B.01, Volume 2, Chapter 05, Proposed Underground DC Cable Route Description.

3.3.2 The working area for cable installation will be linear along the proposed DC cable route alignment. The proposed DC cable working width is typically 30 m wide, extending up to 50 m in width at crossing points and up to 60 m at other locations where a greater working area is required, hereinafter described as the working width. The working width comprises the following:

- Trench in which the DC cables are laid and then backfilled;
- Temporary drainage/water management measures;

- Access track including laybys for offloading cable drums;
- Areas for temporary top and sub-soil storage;
- Joint bays where adjacent sections of cable are joined together.

3.3.3 Fibre optics will be installed along the proposed DC cable route to monitor the temperature, performance and safety critical parts of the cable (Distributed temperature sensing (DTS)). One fibre optic cable will be required for each DC cable with a third cable for communication.

3.3.4 It is assumed that the majority of the DC cables will be installed via the open cut/trench method. Using the open cut method, the DC cable could be installed in one of two ways (to be determined by the appointed contractor); they could either be laid directly into the trench, or a duct could be laid into the trench through which the cables are then pulled. The use of pre-laid ducting could potentially result in soils being reinstated more quickly than would occur with direct trench installation. Through agricultural land, the two DC cables will typically be buried in a trench approximately 1.5 m deep by approximately 1.5 m wide (Chapter 5; ES-2-B.01).

3.3.5 The proposed DC cable route includes Limits of Deviation (LoD). These are a set by a corridor typically 100 m wide within which the proposed DC cable working width (30 m) will be located. As with the working width in places the LoD are wider. The assessment presented is based on a realistic worst-case assuming effects occurring within the LoD. The temporary construction facilities include TCCs, TWAs and accesses. The LoD including temporary construction facilities is referred to as “the base scheme design”.

3.3.6 The detailed construction programme will be determined by the appointed Contractor, however, the assessment is based upon the assumption that the open cut installation of a 1 km section of DC cable would take between four and nine months; and that cable installation would be undertaken in a phased manner so that sections of trench would not be left open for longer than a year (Chapter 5; ES-2-B.01). As stated in paragraph 3.4.4, it is possible that the use of pre-laid ducting could result in reinstatement being achieved more quickly than with a direct trench installation. Therefore, it is assumed that the duration of soil storage for the proposed DC cable route would not exceed 12 months for each section of trench. It is also assumed that the TCCs and TWAs (Figure 9.2) will be required for the full duration of cable installation works. For the purposes of the EIA it has been assumed that installation of the proposed DC cable route will take between two and three years and therefore (Chapter 5; ES-2-B.01), therefore the maximum duration of storage for the top- and sub-soils would be 36 months.

3.3.7 The proposed DC cable working width will be fenced and pre-construction drainage installed prior to being cleared of vegetation and the topsoil will be stripped and stored to one side. A temporary haul road will be formed on the subsoil surface (using bog-mats or hardcore on geotextile or similar where ground conditions require) to allow plant and machinery to move along the cable route. Trenches will be excavated by hydraulic excavators to industry standards.

3.3.8 Following construction, the easement will be levelled, drained and subsoils loosened. Where possible, allowing for the cable infrastructure, topsoil and subsoil will be replaced to the same depths as the original soil profile, with any non-soil substrate (where necessary) replaced first.

Within sections restored to agricultural use, the final minimum depth of soil cover above either the protective cover over the DC cable or the ducting will be 0.9 m. Different Soil Associations exhibit different depths of natural soil profile, however (with the exception of peats) the maximum possible depth of a soil profile is generally considered to be 1.2 m. Therefore, the cables may be laid partially within the depth of the natural soil profile, but will be well below the topsoil layer and the minimum depth of cover over the cables is not considered to compromise the ability of the overlying agricultural crops to produce a functioning and effective root system.

3.3.9 Trenchless crossings will be required via Horizontal Directional Drilling (HDD), pipe jacking or micro-bore. For the purposes of assessment, it is assumed that a temporary working area of 50 m x 50 m (0.25 ha) on both sides of the crossing will be required for launch and reception compounds, for each of the aforementioned crossing techniques. Other than the requirement for temporary working areas, there will be no disturbance to agricultural land due to trenchless crossings.

3.3.10 The presence and operation of the DC cables in the trenchless crossings would not be expected to affect agriculture receptors; as the location and design specification are such that the trenchless crossings would be laid at depth and would not create any ground disturbance, or restrict ploughing depth.

3.3.11 Marker posts may be required along the proposed DC cable route, for example at field boundaries and crossings; and where there are changes in direction.

3.3.12 Land excluded from cultivation, but not used for any construction activities, has not been quantified in the assessments, as arrangements would be subject to individual negotiations and preference of the landowner. For example, construction activities and associated land take may make it difficult to access to some areas, or the reduced area of a field remaining available for cultivation may make it less practical to continue cropping during construction. There is potential for additional off-site land to be under drained to mitigate the impacts of drainage severance.

3.3.13 A specialist LDC has been engaged to undertake the preparation of preliminary pre- and post-construction agricultural land drainage plan that will be agreed with the landowners.

4 Planning Policy and Legislative Considerations

4.1 National Policy

National Planning Policy Framework and Guidance

4.1.1 Paragraphs 111 and 112 of The National Planning Policy Framework (NPPF) (Ref: 9-2) promote the sustainable management and protection of soils and agricultural land consistent with the economic, social and environmental needs of England. These paragraphs state:

- *'Planning policies and decisions should encourage the effective use of land by re-using land that has been previously developed (brownfield land), provided that it is not of high environmental value. Local planning authorities may continue to consider the case for setting a locally appropriate target for the use of brownfield land'; and*
- *'Local planning authorities should take into account the economic and other benefits of the best and most versatile agricultural land. Where significant development on agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.'*

4.1.2 Paragraph 109 of the NPPF states that development should consider the wider benefits the environment provides, particularly through ecosystem services and protect soil resources from unacceptable levels of pollution:

'The planning system should contribute to and enhance the natural and local environment by:

- *Protecting and enhancing valued landscapes, geological conservation interests and soils;*
- *Recognising the wider benefits of ecosystem services… and*
- *Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability'.*

4.1.3 The National Planning Practice Guidance (NPPG) (Ref: 9-15) which accompanies the NPPF also makes specific reference to the protection of soils and BMV agricultural land in paragraph 026:

- *'Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.'*

4.1.4 Additionally, the NPPG defines the statutory role of NE as the advisor to LPAs with respect to land quality issues. As highlighted in Table 9.3 and Appendix 9.2, NE have been consulted on the assessment method.

4.1.5 Together, this national framework encourages the sustainable management of BMV agricultural land, and encourages the protection of its soils. Consequently, potential impacts to the soil

resources and BMV agricultural land are to be considered and the resources protected against development, where their importance overrides the economic benefits of the development itself.

Soil Strategy for England

4.1.6 The National Strategy for England; Safeguarding our Soils (Ref: 9-16), provides a long term guide to direct policy regarding the protection of soils in England. The key tenant of the Strategy is that 'by 2030, all England's soils will be managed sustainably and degradation threats tackled successfully'. The strategy highlights the importance of the protection of soils, especially in agricultural landscapes and during development. Protecting soils ensures the protection of their related ecosystem services, the mitigation of climate change, and prevention of contamination.

4.1.7 In particular, Section 1 of this document, ensures soils are sustainably managed and degradation threats are successfully dealt with; whilst Section 2 puts this into the context of agricultural landscapes. Section 6 ensures effective soil protection during development and construction, with a focus on the protection of soil-related ecosystem services. Furthermore, in response to this DEFRA has constructed a series of best practice guidelines for the handling and storage of soil resources during development (Ref: 9-4).

4.2 Local Policy

4.2.1 Where available, both adopted and emerging local planning policy is considered, as it is likely that emerging policy will be adopted, and hence become the basis for planning decisions within the LPA areas impacted by the DC route, within the lifetime of the project.

East Lindsey District Council

Current Adopted Policy: East Lindsey Local Plan (1995)

4.2.2 None of the Saved Policies of the East Lindsey Local Plan (1995) (Ref: 9-17) relate to soils or agricultural land.

Emerging Policy: Emerging Core Strategy, Submissions Modifications Draft (2016)

4.2.3 The Emerging Core Strategy (Ref: 9-18) will guide growth and development in East Lindsey to 2031, although not currently adopted the Emerging Core Strategy is considered as it is likely to be adopted within the lifetime of the proposed DC cable. The most current version is the Submissions Modifications Draft, which states that farming remains the dominant land use across the District.

4.2.4 Strategic Policy 2: Sustainable Development states that when considering development proposals the Council will take a positive approach that reflects the presumption in favour of sustainable development contained in the NPPF. It will always work proactively with applicants jointly to find solutions which mean that proposals can be approved wherever possible, and to

secure development that improves the economic, social and environmental conditions in the area.

4.2.5 Strategic Policy 10 (SP10): Design states the Council will support well-designed sustainable development, which maintains and enhances the character of the District's towns, villages and countryside by, where possible, supporting the use of brownfield land for development, unless it is of high environmental value, and safeguarding the BMV agricultural land.

Boston Borough Council

Current Adopted Policy

4.2.6 BBC currently uses two Plans to guide decisions on planning applications: the Saved Policies of the adopted Boston Borough Local Plan (April 1999) (Ref: 9-19); and the Boston Borough Interim Plan (Non-Statutory Development Control Policy) 2006 (Ref: 9-20).

4.2.7 The Boston Borough Local Plan was adopted in April 1999. Paragraph 12.5 of the adopted Local Plan states that '*most of Boston Borough is countryside, mainly devoted to intensive agriculture and horticulture. The farmland is among the best and most versatile in the UK and, as such, deserves protecting from unnecessary developmen*t'.

4.2.8 Policy G8 of the adopted Local Plan states 'planning permission will not be granted for developments which will have an adverse effect upon the quality of air or soil such as to lead to:

1) harm to local living or working conditions or the operation of nearby land uses;

2) harm to the natural flora and fauna of interest in the locality; or

3) added constraints on future developments in the area'.

4.2.9 The replacement local plan was withdrawn from the statutory adoption process in February 2006; and a revised version of the replacement local plan was adopted for development control purposes, the Interim Plan (Non-Statutory Development Control Policy) (Ref: 9-20).

4.2.10 Part 8 of Policy G1 of the Interim Plan: General Considerations, states '*planning permission will be granted for development if there are no adverse effects (including contamination) on the quality of air or soil that will be harmful to the amenities of nearby residents and/or other land users or natural flora and fauna of interest in the locality (particularly sites designated as being of local national or international nature conservation importance), and there are likely to be no adverse effects on future developments in the area that are planned for in other policies of this plan*'.

4.2.11 Whilst Policy G2 of the interim plan: Agricultural Land, states that '*planning permission will not be granted for development on the BMV agricultural land unless it can be demonstrated that*:

1) opportunities have been assessed for accommodating the development on previously developed sites and/or on land within the built-up areas/settlement boundaries shown on the inset maps;

2) the amount of land is the minimum required; and

3) there is a strong case for the development which overrides the need to protect such land, or the development is associated with agriculture or forestry, or the development is an acceptable form of farm diversification…, or the land is specifically allocated for development in this plan.'

4.2.12 The interim plan also states that as a large area of agricultural land is located within Boston Borough, the Council wishes to see the "*minimum loss of agricultural land to development*".

Emerging Policy: South East Lincolnshire Local Plan 2011 – 2036

4.2.13 The South East Lincolnshire Joint Strategic Planning Committee is a partnership of BBC, SHDC and LCC who are working together to create a single Local Plan. The Publication Version of the South East Lincolnshire Local Plan 2011 – 2036, was issued for consultation in March 2017 (Ref: 9-21).

4.2.14 Section 2.5 sets out a list of Strategic Priorities to be delivered, Priority 8 is '*to promote the more efficient use of land, prioritise the re-use of previously-developed land and to minimise the loss of South East Lincolnshire's high-quality agricultural land by developing in sustainable locations, at appropriate densities'.*

4.2.15 Although not directly relevant to the DC route, Point 13 of Policy 4: Design of New Development states '*Development proposals will demonstrate how the following issues, where they are relevant to the proposal and are viable will be secured: the use of locally sourced building materials, minimising the use of water and minimising land take, to protect best and most versatile soils.* The Local Plan also directs the reader to the DEFRA best practice guidance for the protection of soils which is referenced throughout this chapter (Ref: 9-4).

North Kesteven District Council

Current Adopted Policy: Central Lincolnshire Local Plan 2012 - 2036

4.2.16 The administrative areas of City of Lincoln Council (CLC), North Kesteven District Council (NKDC) and West Lindsey District Council (WLDC) form the Central Lincolnshire Joint Strategic Planning Committee. The Central Lincolnshire Local Plan 2012 - 2036 (Ref: 9-22), was adopted in April 2017. Paragraph 2.5.2 lists one of the key objectives of the Local Plan as being *'to protect and enhance soil and land resources and quality in Central Lincolnshire'*.

4.2.17 Part G of Policy LP55: Development in the Countryside, Protecting the best and most versatile agricultural land, states:

'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 affecting the best and most versatile agricultural land will only be permitted if:

a. There is insufficient lower grade land available at that settlement (unless development of such lower grade land would be inconsistent with other sustainability considerations); and

b. The impacts of the proposal upon ongoing agricultural operations have been minimised through the use of appropriate design solutions; and

c. Where feasible, once any development which is permitted has ceased its useful life the land will be restored to its former use, and will be of at least equal quality to that which existed prior to the development taken place (this requirement will be secured by planning condition where appropriate).'

South Holland District Council

Current Adopted Policy: South Holland Local Plan (2006)

4.2.18 Paragraph 3.4 of the South Holland Local Plan (Ref: 9-23) states 'The Plan seeks to balance demands for a finite quantity of land. This is reflected in the strategy of'… 'maintaining the quality of the countryside'…. 'minimising the loss of the best and most versatile agricultural land to development ...'

4.2.19 Paragraph 3.29 which relates to Agricultural Land and Development In The Countryside states that 'it is important that the development of greenfield land, including the best and most versatile agricultural land is only allowed after all other opportunities to accommodate development on brownfield land and land within existing defined settlement limits has been assessed'. Whilst paragraph 3.3.7 recognises best and most versatile agricultural land as a nationally important resource, to be safeguarded, such that the loss of this land from agricultural production must be carefully controlled. It further recognises that the prioritisation and phasing of development can help to retain land in agricultural production until it is required for building, but the permanent development of high quality land in the countryside will only be permitted if there are no other suitable sites available.

4.2.20 Consequently, Policy SG5: Non-Agricultural Development On Agricultural Land, states:

Planning Permission will only be granted for the development of the best and most versatile agricultural land (Grades 1, 2 and 3a) where:

1) land of a lower agricultural grade is not available to accommodate the proposed development;

2) available lower grade land has an environmental value recognised by a wildlife, landscape or historic designation that outweighs agricultural considerations; and

3) the development is proposed on land of the lowest possible grade.

Emerging Policy: South East Lincolnshire Local Plan 2011 – 2036

4.2.21 SHDC forms part of The South East Lincolnshire Joint Strategic Planning Committee which is a partnership with BBC and LCC. Therefore, the emerging policy for the District (Ref: 9-21) has been discussed for BBC in paragraphs 4.2.13 to 4.2.15 of this chapter.

5 Baseline Conditions

5.1 Study Area

5.1.1 The Study Area in which the initial baseline studies to inform routeing were undertaken are common across all disciplines. The Study Area included land within the administrative areas of ELDC, BBC, NKDC and SHDC.

5.1.2 The majority of agricultural land within the Study Area is productive arable land, which is typical for Lincolnshire.

5.1.3 The Provisional ALC mapping (Ref: 9-7) indicates that the majority of the agricultural land within the Study Area is ALC Grade 1, with smaller areas of ALC Grade 2 and discrete areas of Grade 3; which is typical for Lincolnshire; although it should be noted that there is variation between the four local administrative areas, with ELDC and NKDC having a lower proportion of Grade 1 land (Table 9.8).

5.1.4 Table 9.8 displays areas of land use within each of the four local administrative areas (ELDC, BBC, NKDC and SHDC); and presents a breakdown of the agricultural land by ALC grade. The percentage figure considers each ALC grade as a percentage of the total agricultural land within the local administrative area, it does not consider urban, non-graded or non-agricultural areas within the total.

Table 9.8: Land Use and ALC Grade for each of the local administrative areas

ALC Grade	Area (ha)	Percent (agricultural land)
East Lindsey District Council		
Agricultural		
Grade 1	7,610.0	4.5
Grade 2	59,739.1	35.5
Grade 3	99,585.2	59.2
Grade 4	1,260.3	0.8
Grade 5	0.0	0.0
Non-agricultural	5,469.5	-
Urban	1,785.4	-
Non-graded	7,657.7	-
Boston Borough Council		

Table 9.8: Land Use and ALC Grade for each of the local administrative areas		
ALC Grade	**Area (ha)**	**Percent (agricultural land)**
Agricultural		
Grade 1	22,586.7	65.7
Grade 2	11,225.3	32.6
Grade 3	0.0	0.0
Grade 4	592.0	1.7
Grade 5	0.0	-
Non-agricultural	688.4	-
Urban	991.8	-
Non-graded	3695.1	-
North Kesteven District Council		
Agricultural		
Grade 1	1,156.9	1.3
Grade 2	36,537.4	41.1
Grade 3	49,956.7	56.3
Grade 4	1,129.7	1.3
Grade 5	0.0	0.0
Non-agricultural	2,601.0	-
Urban	865.5	-
South Holland District Council		
Agricultural		
Grade 1	42,837.8	58.1
Grade 2	29,648.0	40.2
Grade 3	324.7	0.4
Grade 4	974.1	1.3
Grade 5	0.0	0.0
Non-agricultural	0.0	-
Urban	681.1	-
Non-graded	7,084.7	-
Note: Non-graded land is mainly the coast and the Wash.		

5.2 Zone of Influence

5.2.1 The proposed DC cable route is approximately 67.2 km in length and extends from Proposed Landfall in East Lindsey to North Ing Drove in South Holland (Figure 9.1). Consequently, as for the Study Area, the proposed DC cable route falls within the administrative areas of ELDC, BBC, NKDC and SHDC.

5.2.2 The discipline-specific ZoI for Agriculture and Soils comprises the area in which more detailed baseline studies to inform the EIA have been undertaken; and on which the impact assessment presented in this chapter is based. The ZoI for Agriculture and Soils is shown in Figure 9.1, and comprises the land within the LoD, as described in paragraph 3.3.5.

5.2.3 Within the assessment of baseline conditions for the ZoI, two areas are considered, with the same methodologies being applied to both. Firstly, data are presented for the 30 m working width, extending up to 50 m in width at crossing points and up to 60 m at other locations where a greater working area is required, to provide an indication of the actual area of temporary soil disturbance/temporary land take due to the installation of the DC cable. Secondly, data are presented for the ZoI to provide baseline conditions for the wider area in which the working width could be located should changes to the current design freeze be required (Current Design Freeze; 170803).

5.2.4 The ZoI provides a comparison of the baseline information from the proposed DC cable working width and the temporary construction facilities and the ZoI, to provide an indication of the wider environmental conditions which could potentially be impacted by the Scheme.

5.2.5 As for the wider Study Area, the majority of agricultural land within the ZoI is productive arable land, which is typical for Lincolnshire.

5.2.6 The Provisional ALC mapping (Ref: 9-7) indicates that the majority of the agricultural land within the ZoI is ALC Grade 1, with smaller areas of ALC Grade 2 and discrete areas of Grade 3; which is typical for Lincolnshire. Total land use areas within the four local administrative areas (ELDC, BBC, NKDC and SHDC) crossed by the proposed DC cable route; and the area and proportion of land within each ALC grade is presented in Table 9.8.

5.2.7 The DC route is considered in four sections:

- Route Section 1: The Proposed Landfall to Well High Lane (approximately 13.0 km, entirely within ELDC)
- Route Section 2: Well High Lane to A16/Keal Road (approximately 16.9 km, entirely within ELDC)
- Route Section 3: A16/Keal Road to River Witham (approximately 22.1 km, within ELDC and BBC)
- Route Section 4: River Witham to the proposed converter station (approximately 15.2 km, within BBC, NKDC and SHDC).

5.3 Route Section 1: Proposed Landfall to Well High Lane

Soil Resource

5.3.1 A review of the LandIS NATMAP dataset identified the presence of five Soil Associations within Route Section 1 (proposed DC cable working width, ZoI and temporary working areas), as shown in Figure 9.2. A summary of the published Soil Association data is provided in Table 9.9, together with the calculated area of each Soil Association found within the proposed DC cable working width and temporary construction areas.

5.3.2 The proposed DC cable working width within Route Section 1 covers approximately 57.0 ha. An additional 11.5 ha will be utilised for the temporary working areas (TCCs and TWAs) within Route Section 1.

5.3.3 The Soil Associations; Salop, Holderness, Fladbury 2 and Wallasea 2 are considered to be at small to very small risk of water erosion (Ref: 9-6); and therefore have been assessed as less sensitive to damage and susceptible to loss than lighter textured, sandy soils (low receptor sensitivity). These soils comprise 96.8% of the proposed DC cable (30 m) working width (96.9% of the ZoI).

5.3.4 Soils of the Andover 1 Soil Association are of a moderate risk of water erosion (Ref: 9-6), and are therefore assessed as sensitive to damage and susceptible to loss (medium receptor sensitivity). These soils comprise 3.2% of the proposed DC cable working width (3.1% of the ZoI).

Table 9.9: Soil Associations in Route Section 1								
Soil Association	**Soil Series**	**Geology**	**Soil Type**	**Soil Characteristics**	**Wetness Class**	**Erodibility (Ref: 9-5)**	**Area in working width (ha). (% in working width)**	**Area in temporary construction areas (ha). (%)**
Andover 1 (343h)	Andover, Panholes, Coombe, Upton, Charity	Chalk	Brown rendzina	Shallow well drained calcareous silty soils over chalk on slopes and crests Deep calcareous and non-calcareous fine silty soils in valley bottoms	All the soils are well drained (Wetness Class I) and rest on permeable chalk	Moderate risk of water erosion	1.8 ha (3.2 %)	1.1 ha (9.4 %)
Salop (711m)	Salop, Clifton, Flint, Crewe	Drift mostly derived from Permo-Triassic rocks	Stagnogley soils, argillic brown earths	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Most of the soils when undrained are waterlogged for long periods in winter (Wetness Class IV) The soils can be improved to Wetness Class III with underdrainage	Very small risk of water erosion	2.4 ha (4.4 %)	-

Table 9.9: Soil Associations in Route Section 1

Soil Association	Soil Series	Geology	Soil Type	Soil Characteristics	Wetness Class	Erodibility (Ref: 9-5)	Area in working width (ha). (% in working width)	Area in temporary construction areas (ha). (%)
Holderness (711u)	Holderness, Burlingham	Chalky Till	Typical stagnogley soils	Slowly permeable seasonally waterlogged fine loamy soils and similar soils with only slight waterlogging Narrow strips of clayey alluvial soils	Holderness profiles are slowly permeable and seasonally waterlogged (Wetness Class III), but Burlingham profiles are only occasionally waterlogged (Wetness Class II or III) Drainage measures are essential for continuous arable cropping	Small risk of water erosion	25.2 ha (45.8 %)	6.6 ha (57.4 %)
Fladbury 2 (813c)	Fladbury, Stixwould, Trent	River alluvium	Pelo-alluvial gley soils	Stoneless clayey soils variably affected by groundwater some with sandy subsoils Some similar fine loamy soils Flat land Risk of flooding	The soils are waterlogged for long periods of the winter (Wetness Class IV) and waterlogging can occur during the growing season (Wetness Class V) in low-lying sites	Very small risk of water erosion	1.2 ha (2.2 %)	-

Table 9.9: Soil Associations in Route Section 1

Soil Association	Soil Series	Geology	Soil Type	Soil Characteristics	Wetness Class	Erodibility (Ref: 9-5)	Area in working width (ha). (% in working width)	Area in temporary construction areas (ha). (%)
Wallasea 2 (813g)	Wallasea, Newchurch, Blacktoft, Wishbech	Marine alluvium	Pelo-alluvial gley soils	Deep stoneless clayey soils Calcareous in places Some deep calcareous silty soils Flat land often with low ridges giving a complex soil pattern	Most of the land is pump-drained and the more permeable Blacktoft and Wisbech soils are well drained (Wetness Class I) Wallasea and Newchurch soils are less permeable but respond to underdrainage; (Wetness Class II) but undrained soils are waterlogged for long periods in winter (Wetness Class III or IV)	Very small risk of water erosion	24.4 ha (44.4 %)	3.8 ha (33.2 %)
* Reproduced from Soil Survey of England and Wales 1984 Soils and their Use in Eastern England (Ref: 9-8)								

Agricultural Land Quality & Land Use

5.3.5 As agreed with NE (Appendix 9.2), ALC grading within the proposed DC cable working width and the ZoI was derived from the desk based methodology described in Appendix 9.1, and verified using the NE strategic 1:250,000 scale Predictive 'Likelihood of best and most versatile land' mapping (Ref: 9-11).

5.3.6 The Provisional ALC of the proposed DC cable working width within Route Section 1 is comprised two-thirds of Grade 3 and one-third of Grade 2. This is reflected by the wider ZoI, see Table 9.10 and Fig 9.1. Provisional ALC of the TWAs, including the ancillary areas, comprise two-thirds of Grade 2 and one-third of Grade 3, see Table 9.10.

Table 9.10: ALC Grading Route Section 1

	DC cable working width		Temporary works areas		ZoI including DC cable working width	
ALC Grade	Area (ha)	Area (ha)	Area (ha)	Percent (%)	Area (ha)	Percent (%)
Grade 1	0.0	0.0	0.0	0.0	0.0	0.0
Grade 2	15.7	27.5	7.7	66.8	45.7	33.2
Grade 3	41.3	72.5	3.8	33.2	92.2	66.8
Grade 4	0.0	0.0	0.0	0.0	0.0	0.0
Grade 5	0.0	0.0	0.0	0.0	0.0	0.0

5.3.7 The Provisional ALC data were used in conjunction with published soils data, LandIS NATMAP dataset (Ref: 9-6) and "Soils and their use in Eastern England" (Ref: 9-8), to determine the likely proportion of BMV land within each of the five Soil Associations identified within Route Section 1, through the identification of areas of potential Subgrade 3a (BMV) or 3b (non-BMV) land as detailed in Appendix 9.1.

5.3.8 The verification exercise revealed that the WA desk based approach agreed with the likelihood of BMV categories as identified by NE for the Salop, Holderness and Fladbury 2 Soil Associations in Route Section 1. The estimation of the proportion of Subgrade 3a (BMV land) in the Andover 1 Soil Association determined in the desk based assessment was more conservative than that identified in NE's strategic Predictive mapping, whilst the estimation of the proportion of Subgrade 3a for Wallasea 2 was more conservative in the NE's strategic Predictive mapping (Appendix 9.1).

5.3.9 In order to present a conservative assessment, the Subgrade 3a and 3b estimates determined in the desk based assessment were used in the impact assessment for Salop, Holderness, Fladbury 2 and Andover 1 Soil Associations, whilst the NE data has been adopted for the Wallasea 2 assessment (100% Subgrade 3a, BMV).

5.3.10 Table 9.11 provides the estimate of temporary land take within each ALC grade, including Subgrade 3a and 3b within each identified Soil Association, due to the proposed DC cable working width and temporary construction areas in Route Section 1. The data is derived from the desk based assessment as described in Appendix 9.1, with the exception of Wallasea 2, in which the NE data has been adopted following verification.

5.3.11 Although there is flexibility for the working width to move within the wider ZoI, the high levels of similarity in soil types and percentage ALC within the ZoI (as defined in Table 9.11) means that should deviation from the assessed proposed DC cable route occur, the distribution of agricultural land quality (ALC Grade) subject to temporary land take within the working width is unlikely to vary significantly from that presented below.

Table 9.11: The combined ALC grades and Soil Association areas in Route Section 1

	BMV			Non-BMV
Soil Association	**Grade 1**	**Grade 2**	**Subgrade 3a**	**Subgrade 3b**
Andover 1 (343h)	0.0	2.8	0.0	0.0
Salop (711m)	0.0	0.2	1.2	1.0
Holderness (711u)	0.0	20.3	6.7	4.8
Fladbury 2 (813c)	0.0	0.0	0.1	1.1
Wallasea 2 (813g) *	0.0	0.0	28.3	0.0
	Total BMV: 59.6 ha			**Total non-BMV: 6.9 ha**
***** Subgrade 3a/3b distribution adjusted to most conservative value (NE strategic Predictive mapping, Ref: 9-11)				

Agri-Environment Schemes

5.3.12 A review of AES present in the ZoI for Route Section 1 revealed one land parcel (LP 2343) enrolled in an Entry plus Higher Level Stewardship scheme (EHLS; medium receptor sensitivity) (Ref: 9-10), as of the 17 May 2017. This AES is also crossed by the proposed DC cable working width and one TCC (P1).

5.4 Route Section 2: Well High Lane to A16 (Keal Road)

Soil Resource

5.4.1 A review of the LandIS NATMAP dataset identified six Soil Associations within Route Section 2 (proposed DC cable working width, ZoI and temporary working areas), as shown in Figure 9.2. A summary of the published Soil Association data is provided in Table 9.12, together with the calculated area of each Soil Association found within the proposed DC cable working width and temporary construction areas.

5.4.2 The proposed DC cable working width within Route Section 2 covers approximately 61.6 ha. An additional 11.4 ha will be utilised for the temporary working areas within Route Section 2.

5.4.3 The Soil Associations; Tathwell, Wickham 2 and Fladbury 2 are of a small to very small risk of water erosion (Ref: 9-5); and have been assessed as less sensitive to damage and susceptible to loss than lighter textured, sandy soils (**low receptor sensitivity**). These soils comprise 30.3% of the proposed DC cable working width (30.2% of the ZoI).

5.4.4 The Andover 1 and Swaffham Prior Soil Associations are of a moderate risk of water erosion, and are therefore assessed as sensitive to damage and susceptible to loss (**medium receptor sensitivity**). These soils comprise 33.1% of the proposed DC cable working width (34.7% of the ZoI).

5.4.5 The Cuckney 2 Soil Association is of a high risk of water erosion, and are therefore assessed as sensitive to damage and susceptible to loss (**high receptor sensitivity**). These soils comprise 36.6% of the proposed DC cable working width (35.1% of the ZoI).

Table 9.12: Soil Associations in Route Section 2

Soil Association	Soil Series	Geology	Soil Type	Soil Characteristics	Wetness Class	Erodibility	Area in working width (ha). (% in working width)	Area in temporary construction areas (ha). (% in temporary construction areas)
Andover 1 (343h)	Andover, Panholes, Coombe, Upton, Charity	Chalk	Brown rendzina	Shallow well drained calcareous silty soils over chalk on slopes and crests Deep calcareous and non-calcareous fine silty soils in valley bottoms Striped soil patterns locally	All the soils are well drained (Wetness Class I) and rest on permeable chalk	Moderate risk of water erosion	18.7 (30.4 %)	1.5 (13.6 %)
Swaffham Prior (511e)	Swaffham Prior, Soham, Moulton, Newmarket, Rudham	Chalky drift and chalk	Typical brown calcareous earths	Well drained calcareous coarse and fine loamy soils over chalk rubble Deep non-calcareous loamy soils in places Striped and polygonal soil patterns locally Slight risk of water erosion	The soils and substrates are permeable and well drained (Wetness Class I), and readily absorb winter rainfall	Moderate risk of water erosion	1.7 (2.7 %)	1.8 (16.1 %)
Cuckney 2 (551c)	Cuckney, Curdridge,	Cretaceous sand and	Typical brown	Well drained sandy and ferruginous fine	Cuckney and Spilsby series are	High risk of water	22.5	6.3

Table 9.12: Soil Associations in Route Section 2								
Soil Association	**Soil Series**	**Geology**	**Soil Type**	**Soil Characteristics**	**Wetness Class**	**Erodibility**	**Area in working width (ha). (% in working width)**	**Area in temporary construction areas (ha). (% in temporary construction areas)**
	Spilsby	sandstone	sands	loamy soils over soft sandstone	both well drained (Wetness Class I) because of the permeability of the soils and underlying rocks Curdridge soils are occasionally waterlogged by groundwater (Wetness Class II)	erosion but also at risk of wind	(36.6 %)	(55.3 %)
Tathwell (571n)	Tathwell, Andover, Burlingham	Till over chalk	Typical argillic brown earths	Well drained reddish fine loamy over clayey soils and similar fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging	Tathwell and Andover soils are well drained (Wetness Class I) but Burlingham soils are occasionally waterlogged because of slowly permeable lower layers (Wetness Class II)	Small risk of water erosion	7.6 (12.3 %)	1.7 (15.0 %)
Wickham 2	Wickham,	Drift over	Typical	Slowly permeable	These soils which	Very small	9.6	

Table 9.12: Soil Associations in Route Section 2								
Soil Association	**Soil Series**	**Geology**	**Soil Type**	**Soil Characteristics**	**Wetness Class**	**Erodibility**	**Area in working width (ha). (% in working width)**	**Area in temporary construction areas (ha). (% in temporary construction areas)**
(711f)	Denchworth, Oxpasture, Evesham	Jurassic and Cretaceous clay or mudstone	stagnogley soils	seasonally waterlogged fine loamy over clayey, fine silty over clayey and clayey soils	have slowly permeable subsoils are seasonally waterlogged (Wetness Class III and IV)	risk of water erosion	(15.5 %)	
Fladbury 2 (813c)	Fladbury, Stixwould, Trent	River alluvium	Pelo-alluvial gley soils	Stoneless clayey soils variably affected by groundwater some with sandy subsoils Some similar fine loamy soils Flat land Risk of flooding	The soils are waterlogged for long periods of the winter (Wetness Class IV) and waterlogging can occur during the growing season (Wetness Class V) in low-lying sites	Very small risk of water erosion	1.5 (2.5%)	

Agricultural Land Quality & Land Use

5.4.6 The Provisional ALC of the proposed DC cable working width within Route Section 2 is primarily comprised of land of an almost even division of Grade 2 (46%) and Grade 3 (54%), with a small area of Grade 4 (0.6%); this is largely reflected within the wider ZoI where the division of Grade 2, Grade 3 and Grade 4 is 44.1%, 55.1% and 0.8% respectively (see Table 9.13 and Figure 9.1).

Table 9.13: ALC Grading in Route Section 2

	DC cable working width		Temporary construction areas		ZoI including DC cable working width	
ALC Grade	Area (ha)	Percent (%)	Area (ha)	ALC Grade	Area (ha)	Percent (%)
Grade 1	0.0	0.0	0.0	Grade 1	0.0	0.0
Grade 2	28.2	45.8	4.9	Grade 2	28.2	45.8
Grade 3	33.0	53.6	6.5	Grade 3	33.0	53.6
Grade 4	0.4	0.6	0.0	Grade 4	0.4	0.6
Grade 5	0.0	0.0	0.0	Grade 5	0.0	0.0

5.4.7 Table 9.14 provides the estimate of temporary land take within each ALC grade, including Subgrade 3a and 3b within each identified soil association, due to the proposed DC cable working width and temporary construction areas in Route Section 2. Although there is flexibility for the working width to move within the wider ZoI, the high levels of similarity in soil types and percentage ALC within the ZoI (as defined in Table 9.13) means that should deviation from the assessed proposed DC cable route occur, the distribution of agricultural land quality (ALC Grade) subject to temporary land take within the working width is unlikely to vary significantly from that presented below.

5.4.8 The verification exercise revealed that the WA desk based approach agreed with the likelihood of BMV categories as identified by NE for the Swaffham Prior, Tathwell, Wickham 2 and Fladbury 2 Soil Associations in Route Section 2. The estimation of the proportion of Subgrade 3a (BMV land) in the Andover 1 and Cuckney 2 Soil Associations determined in the desk based assessment was more conservative than that identified in NE's strategic Predictive mapping (Appendix 9.1).

5.4.9 In order to present a conservative assessment, the Subgrade 3a and 3b estimates determined in the desk based assessment shown in Appendix 9.1, were used in the impact assessment for Route Section 2.

Table 9.14: The combined ALC grades and Soil Association areas in Route Section 2				
	BMV (ha)			Non-BMV (ha)
Soil Association	Grade 1	Grade 2	Subgrade 3a	Subgrade 3b
Andover 1 (343h)	0.0	6.0	9.0	4.9
Swaffham Prior (511e)	0.0	0.0	2.9	0.6
Cuckney 2 (551c)	0.0	13.4	15.4	0.0
Tathwell (571n)	0.0	8.6	0.7	0.0
Wickham 2 (711f)	0.0	4.3	2.1	3.1
Fladbury 2 (813c)	0.0	0.8	0.1	0.7
	Total BMV: 63.4 ha			**Total non-BMV: 9.3 ha**

Agri-Environment Schemes

5.4.10 A review of AES present in the ZoI of Route Section 2 revealed seven land parcels enrolled in an AES. As of the 17 May 2017, three land parcels (18964, 25970 and 16552) are currently enrolled in an Entry Level Stewardship Scheme (ELS; **low receptor sensitivity**), whilst four land parcels (2218, 1224, 3472 and 7267) are currently enrolled in an EHLS (**medium receptor sensitivity**) (Ref: 9-10). It should be noted that three of the land parcels (3472, 7267 and 16552) are present within the ZoI, but are not crossed by the proposed DC cable route; however, these are considered in the assessment as there is flexibility for the DC cable route to move within the ZoI. It is also important to note that land parcel 16552 also has land enrolled in an ELS in Route Section 3.

5.4.11 Land parcels 1224 and 2218 both have one TCC located on the parcel (T6 and S1).

5.5 Route Section 3: A16 (Keal Road) to River Witham

Soil Resource

5.5.1 A review of the LandIS NATMAP dataset identified six Soil Associations within Route Section 3 (proposed DC cable working width, ZoI and temporary working areas), as shown in Figure 9.2. However, the dominant association is Wallasea 2 which makes up 64.9% of the soils within the proposed DC cable working width (Table 9.15).

5.5.2 A summary of the published Soil Association data is provided in Table 9.15, together with the calculated area of each association found within the proposed DC cable working width and temporary construction areas.

5.5.3 The proposed DC cable working width within Route Section 3 covers approximately 86.4 ha. An additional 15.2 ha will be utilised for the temporary working areas within Route Section 3.

5.5.4 All Soil Associations identified within Route Section 3 are of a very small to small risk of water erosion (Ref: 9-5); and have been assessed as less sensitive to damage and susceptible to loss than lighter textured, sandy soils (**low receptor sensitivity**) (Table 9.15).

Table 9.15: Soil Associations in Route Section 3

Soil Association	Soil Series	Geology	Soil Type	Soil Characteristics	Wetness Class	Erodibility	Area in working width (ha). (% in working width)	Area in temporary construction areas (ha). (% in temporary construction areas)
Wickham 2 (711f)	Wickham, Denchworth, Oxpasture, Evesham	Drift over Jurassic and Cretaceous clay or mudstone	Typical stagnogley soils	Slowly permeable seasonally waterlogged fine loamy over clayey, fine silty over clayey and clayey soils	These soils which have slowly permeable subsoils are seasonally waterlogged (Wetness Class III and IV)	Very small risk of water erosion	1.4 (1.6 %)	-
Salop (711m)	Salop, Clifton, Flint, Crewe	Drift mostly derived from Permo-Triassic rocks	Stagnogley soils, argillic brown earths	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Most of the soils when undrained are waterlogged for long periods in winter (Wetness Class IV) The soils can be improved to Wetness Class III with underdrainage	Very small risk of water erosion	18.9 (21.9 %)	2.8 (18.2%)
Wisbech (812b)	Wisbech, Romney	Marine alluvium	Calcareous alluvial gley soils	Deep stoneless calcareous coarse silty soils Groundwater usually controlled by ditches or	The soils are waterlogged for long periods in winter (Wetness Class IV), where there has been little	Very small risk of water erosion but also at risk of	2.5 (2.9 %)	1.7 (11.3%)

Table 9.15: Soil Associations in Route Section 3								
Soil Association	**Soil Series**	**Geology**	**Soil Type**	**Soil Characteristics**	**Wetness Class**	**Erodibility**	**Area in working width (ha). (% in working width)**	**Area in temporary construction areas (ha). (% in temporary construction areas)**
				pumps Flat land with low ridges Risk of wind erosion locally	improvement in land drainage and the soil mottling reflects the current water regime Where there are ditches, the soils are only occasionally waterlogged (Wetness Class II)	wind erosion		
Agney (812c)	Agney, Wisbech	Marine alluvium	Calcareous alluvial gley soils	Deep stoneless calcareous fine and coarse silty soils Groundwater usually controlled by ditches and pumps Flat land	The soils are very porous with numerous root channels and burrows formed under saltmarsh before reclamation The land is mostly drained by ditches and pumps and the soils are rarely waterlogged (Wetness Class I)	Very small risk of water erosion	5.0 (5.8 %)	-

Table 9.15: Soil Associations in Route Section 3								
Soil Association	**Soil Series**	**Geology**	**Soil Type**	**Soil Characteristics**	**Wetness Class**	**Erodibility**	**Area in working width (ha). (% in working width)**	**Area in temporary construction areas (ha). (% in temporary construction areas)**
Wallasea 2 (813g)	Wallasea, Newchurch, Blacktoft, Wishbech	Marine alluvium	Pelo-alluvial gley soils	Deep stoneless clayey soils Calcareous in places Some deep calcareous silty soils Flat land often with low ridges giving a complex soil pattern	Most of the land is pump-drained and the more permeable Blacktoft and Wisbech soils are well drained (Wetness Class I) Wallasea and Newchurch soils are less permeable but respond to underdrainage; (Wetness Class II) but undrained soils are waterlogged for long periods in winter (Wetness Class III or IV)	Very small risk of water erosion	56.1 (64.9 %)	8.2 (53.9%)
Blackwood (821b)	Blackwood, Formby, Ollerton, Quorndon	Glaciofluvial drift	Typical sandy gley soils	Deep sandy and coarse loamy soils Slightly stony	Where undrained, long winter waterlogging is present (Wetness	Small risk of wind erosion	2.5 (2.9 %)	2.5 (16.6%)

Table 9.15: Soil Associations in Route Section 3								
Soil Association	**Soil Series**	**Geology**	**Soil Type**	**Soil Characteristics**	**Wetness Class**	**Erodibility**	**Area in working width (ha). (% in working width)**	**Area in temporary construction areas (ha). (% in temporary construction areas)**
					Class III & IV) Influenced by fluctuating groundwater, well drained if groundwater low (Wetness Class I)			

Agricultural Land Quality & Land Use

5.5.5 The Provisional ALC of the proposed DC cable working width within Route Section 3 is comprised three-quarters of Grade 2 and one-quarter of Grade 3. This is reflected by the ZoI, see Table 9.16 and Figure 9.1. Whereas the TWA are entirely located within Grade 2 land.

Table 9.16: ALC Grading in Route Section 3

	DC cable working width		Temporary works areas		ZoI including DC cable working width	
ALC Grade	Area (ha)	Percent (%)	Area (ha)	ALC Grade	Area (ha)	Percent (%)
Grade 1	0.0	0.0	0.0	Grade 1	0.0	0.0
Grade 2	65.5	75.8	15.2	Grade 2	65.5	75.8
Grade 3	20.9	24.2	0.0	Grade 3	20.9	24.2
Grade 4	0.0	0.0	0.0	Grade 4	0.0	0.0
Grade 5	0.0	0.0	0.0	Grade 5	0.0	0.0

5.5.6 Table 9.17 provides the estimate of temporary land take within each ALC grade, including Subgrade 3a and 3b, within each identified Soil Association due to the proposed DC cable working width and temporary construction areas in Route Section 3. Although there is flexibility for the working width to move within the wider ZoI, the high levels of similarity in soil types and ALC within the ZoI (as defined in Table 9.11) means that should deviation from the assessed proposed DC cable route occur, the distribution of agricultural land quality (ALC Grade) subject to temporary land take within the working width is unlikely to vary significantly from that presented below.

5.5.7 The verification exercise revealed that the WA desk based approach agreed with the likelihood of BMV categories as identified by NE for the Wickham 2, Salop and Wisbech Soil Associations in Route Section 3. The estimation of the proportion of Subgrade 3a (BMV land) in the Blackwood Soil Association determined in the desk based assessment was more conservative than that identified in NE's strategic Predictive mapping, whilst the estimation of the proportion of Subgrade 3a for Wallasea 2 was more conservative in the NE's strategic Predictive mapping (Appendix 9.1).

5.5.8 In order to present a conservative assessment, the Subgrade 3a and 3b estimates determined in the desk based assessment were used in the impact assessment for Wickham 2, Salop and

Wisbech and Blackwood Soil Associations, whilst the NE data has been adopted for the Wallasea 2 assessment (100% Subgrade 3a, BMV).

Table 9.17: The combined ALC grades and Soil Association areas in Route Section 3

	BMV (ha)			Non-BMV (ha)
Soil Association	Grade 1	Grade 2	Soil Association	Grade 1
Wickham 2 (711f)	0.0	0.0	Wickham 2 (711f)	0.0
Salop (711m)	0.0	12.3	Salop (711m)	0.0
Wisbech (812b)	0.0	4.2	Wisbech (812b)	0.0
Agney (812c)	0.0	5.0	Agney (812c)	0.0
Wallasea 2 (813g)*	0.0	55.3	Wallasea 2 (813g)*	0.0
Blackwood (821b)	0.0	3.9	Blackwood (821b)	0.0
	Total BMV: 96.4 ha			**Total non-BMV: 5.2 ha**
***** Subgrade 3a/3b distribution adjusted to most conservative value (NE strategic Predictive mapping; Ref: 9-11)				

Agri-Environment Schemes

5.5.9 A review of AES present in the ZoI of Route Section 3 revealed eight land parcels enrolled in an AES. Five land parcels (19270, 16552, 13957, 22985 and 23135) are currently enrolled in an ELS (**low receptor sensitivity**), two land parcels (11800 and 8174) are currently enrolled in an EHLS (**medium receptor sensitivity**), whilst one land parcel is enrolled in an Organic Entry plus Higher Level Stewardship Scheme (OEHLS; **high receptor sensitivity**) (Ref: 9-10). All AES are crossed by the proposed DC cable working width. It is important to note the land parcel 14784 also has land enrolled in an ELS in Route Section 2.

5.5.10 Land parcel 8174 has one TCC located on the parcel enrolled in an EHLS (S5).

5.6 Route Section 4: River Witham to the Proposed Converter Station

Soil Resource

5.6.1 A review of the LandIS NATMAP dataset identified four Soil Associations within Route Section 4 (proposed DC cable working width, ZoI and temporary working areas), as shown in Figure 9.2. However, the dominant association is Wallasea 2 which makes up 93.6% of the soils within the proposed DC cable working width within Route Section 4 (Table 9.15).

5.6.2 A summary of the published Soil Association data is provided in Table 9.18, together with the calculated area of each association found within the proposed DC cable working width and temporary construction areas.

5.6.3 The proposed DC cable working width within Route Section 4 covers approximately 60.4 ha. An additional 8.8 ha will be utilised for the temporary working areas within Route Section 4.

5.6.4 All soil associations identified within Route Section 4 are of a very small risk of water erosion (Ref: 9-5), and have been assessed as less sensitive to damage and susceptible to loss than lighter textured, sandy soils (**low receptor sensitivity**).

Table 9.18: Soil Associations in Route Section 4								
Soil Association	**Soil Series**	**Geology**	**Soil Type**	**Soil Characteristics**	**Wetness Class**	**Erodibility**	**Area in working width (ha). (% in working width)**	**Area in temporary construction areas (ha). (% in temporary construction areas)**
Beccles 1 (711r)	Beccles, Ragdale	Chalky Till	Stagnogley soils	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Relatively impermeable In land with adequate underdrainage the soils are seasonally waterlogged (Wetness Class III) but on undrained land they are waterlogged for longer periods in winter (Wetness Classes III and IV)	Very small risk of water erosion	1.3 (2.1 %)	-
Wisbech (812b)	Wisbech, Romney	Marine alluvium	Calcareous alluvial gley soils	Deep stoneless calcareous coarse silty soils Groundwater usually controlled by ditches or pumps Flat land with low ridges Risk of wind erosion locally	The soils are waterlogged for long periods in winter (Wetness Class IV), where there has been little improvement in land drainage and the soil mottling reflects the current water regime Where there are ditches, the soils are only occasionally waterlogged (Wetness Class II)	Very small risk of water erosion but also at risk of wind erosion	2.0 (3.3 %)	3.0 (34.0%)

Table 9.18: Soil Associations in Route Section 4

Soil Association	Soil Series	Geology	Soil Type	Soil Characteristics	Wetness Class	Erodibility	Area in working width (ha). (% in working width)	Area in temporary construction areas (ha). (% in temporary construction areas)
Agney (812c)	Agney, Wisbech	Marine alluvium	Calcareous alluvial gley soils	Deep stoneless calcareous fine and coarse silty soils Groundwater usually controlled by ditches and pumps Flat land	The soils are very porous with numerous root channels and burrows formed under saltmarsh before reclamation. The land is mostly drained by ditches and pumps and the soils are rarely waterlogged (Wetness Class I)	Very small risk of water erosion	0.6 (1.0 %)	-
Wallasea 2 (813g)	Wallasea, Newchurch, Blacktoft, Wishbech	Marine alluvium	Pelo-alluvial gley soils	Deep stoneless clayey soils Calcareous in places Some deep calcareous silty soils Flat land often with low ridges giving a complex soil pattern	Most of the land is pump-drained and the more permeable Blacktoft and Wisbech soils are well drained (Wetness Class I) Wallasea and Newchurch soils are less permeable but respond to underdrainage; (Wetness Class II) but undrained soils are waterlogged for long periods in winter (Wetness Class III or IV)	Very small risk of water erosion	56.5 (93.6 %)	5.8 (66.0%)

Agricultural Land Quality & Land Use

5.6.5 The Provisional ALC of Route Section 4 is comprised of approximately one-third Grade 1 and two-thirds Grade 2 (BMV) agricultural land (see Table 9.19 and Figure 9.1).

Table 9.19: ALC Grading in Route Section 4

	DC cable working width		Temporary construction areas Temporary construction areas		ZoI including DC cable working width	
ALC Grade	Area (ha)	Percent (%)	Area (ha)	ALC Grade	Area (ha)	Percent (%)
Grade 1	19.3	31.9	4.4	Grade 1	19.3	31.9
Grade 2	41.1	68.1	4.3	Grade 2	41.1	68.1
Grade 3	0.0	0.0	0.0	Grade 3	0.0	0.0
Grade 4	0.0	0.0	0.0	Grade 4	0.0	0.0
Grade 5	0.0	0.0	0.0	Grade 5	0.0	0.0

5.6.6 Table 9.20 provides the estimate of temporary land take within each ALC grade, due to the proposed DC cable working width and temporary construction areas in Route Section 4. Although there is flexibility for the working width to move within the wider ZoI, the high levels of similarity in soil types and percentage ALC within the ZoI (as defined in Table 9.19) means that should deviation from the assessed proposed DC cable route occur, the distribution of agricultural land quality (ALC Grade) subject to temporary land take within the working width is unlikely to vary significantly from that presented below.

5.6.7 The ALC Grade of the identified soil associations in Route Section 4 are Grades 1 and 2, therefore the verification exercise is not required on this section.

Table 9.20: The combined ALC grades and Soil Association areas in Route Section 4

	BMV (ha)		
Soil Association	Grade 1	Grade 2	Subgrade 3a
Wisbech (812b)	5.0	0.0	0.0
Wallasea 2 (813g)	18.7	43.6	0.0
Beccles 1 (711r)	0.0	1.3	0.0

Table 9.20: The combined ALC grades and Soil Association areas in Route Section 4			
	BMV (ha)		
Soil Association	Grade 1	Grade 2	Subgrade 3a
Agney (812c)	0.0	0.6	0.0
	Total BMV: 69.2 ha		

Agri-Environment Schemes

5.6.8 A review of AES present in the ZoI of Route Section 4 revealed that as of 17 May 2017, there are no land parcels enrolled in an AES.

6 Potential Impacts

6.1 Overview of Potential Impacts

Temporary Construction Impacts

6.1.1 Temporary impacts typically occur during the construction phase only.

6.1.2 The following potential temporary effects have been identified and will be addressed in the Agriculture and Soils chapter:

- Loss of agricultural land (adverse);
- Damage or disturbance to soil resources (adverse);
- Loss of soil resources (adverse); and
- Loss of eligibility for AES (adverse).

6.1.3 There is a potential for airborne dust to be generated during soil handling operations and as a consequence of the wind erosion of dry soil stockpiles. This dust has the potential to impact surrounding crops during construction. However, soil erosion (dust generation) is considered in the assessment of loss of soil resources and therefore not considered separately.

6.1.4 There is a potential for a disruption to agricultural land drainage, however this is not assessed within this chapter; as a specialist LDC has been engaged to undertake pre- and post-construction agricultural land drainage design as part of the Scheme design.

6.1.5 The Agriculture and Soils assessment only considers the potential environmental impacts of the proposed DC cable route. Potential impacts to farm business are therefore not assessed, but have been addressed through on-going discussion between NGVL and affected businesses.

6.1.6 The impact of heat generated by the cables on the above ground crops is not considered sufficient to cause 'sterile strips' on agricultural land, and the continuing viability of land above cables can be readily witnessed in areas where existing underground cables (UGC) are installed. The UGCs which will be installed along the DC route are designed to have a low resistance, and hence low losses to prevent the cable heating up under normal operating conditions. During events when there is a fault, there is potential for heat to be generated, however the heat would not be sufficient in scale or in duration to cause sterile strips. Therefore, the potential impact of heat generation is not considered further.

Loss of agricultural land

6.1.7 During construction activities, there will be the temporary loss of approximately 265.1 ha of agricultural land within the DC cable working width and a further 46.8 ha temporarily lost to TCCs, of which 251.8 ha (95.0%) is likely to be BMV agricultural land.

6.1.8 As set out in paragraph 2.7.7, a threshold of 20 ha of **permanent** BMV loss is used to determine whether the loss is significant or not. Therefore, although the loss of BMV land due to the proposed DC cable is greater than 20 ha, as this loss is temporary with all land being restored to agricultural use post-construction, the effect is not significant. Therefore, the temporary loss of agricultural land is not considered further within the impact assessment, but data are presented for information purposes.

Disturbance to Soil Resource

6.1.9 The construction activities may result in a temporary disturbance of soil resources (adverse), which could result in a longer-term impact on the soil resource. Construction activities which have an impact upon soil resources include, but are not limited to:

- Stripping and stockpiling of topsoil and subsoil, storage and reinstatement;
- Ground excavation;
- Stockpiling materials;
- Levelling ground;
- Trenching;
- Haul road construction; and
- Vehicle movements on site.

6.1.10 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 (adverse). 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.

Loss of Soil Resource

6.1.11 During the construction activities, there may be a physical loss of soil resource as a result of soil removal, handling and storage in the construction phase where soils are temporarily stripped to enable construction activities. Loss of soils may also include the theft of stockpiles soils; however, it is assumed that within proposed DC cable route all soil resources will be retained on site and not exported for reuse elsewhere.

6.1.12 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. For example, 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.

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

6.1.14 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.

Agri-Environment Schemes

6.1.15 The temporary impact to the AES during construction activities may result in the loss of compliance with/eligibility for any AES in place.

6.1.16 It should be noted that AES are designed to provide areas of ecological enhancement and therefore some of the AES considered in this chapter may also contain features which are considered to be ecological constraints, for example species diverse hedgerows. This chapter focuses on the impacts of the DC route in terms of changes in AES eligibility of landholdings currently enrolled in an AES and does not consider the ecological or economic implications of the schemes.

Longer Term, Operational and Permanent Impacts

6.1.17 For the purposes of this EIA, operational, longer-term and permanent effects are those which would occur as a result of the required land take or as a result of the operation of the DC cable. This would include effects which may begin during construction and endure for the lifetime of the DC cables; effects which may begin during construction and endure for an extended period of time; or effects which occur during operation only.

Loss of Agricultural Land

6.1.18 During the construction and operational activities, there would be no permanent loss of agricultural land, therefore longer term, operational and permanent effects have been scoped out of the assessment.

Disturbance to Soil Resource

6.1.19 The disturbance of soil resources within the proposed DC cable route is largely restricted to construction; however, during the operational lifetime of the proposed DC cable route, there is a

potential for additional disturbance (excavation) of soil resources to occur during any maintenance or remedial works which may be required. Although the scale and extent of these works would be significantly less than required for initial construction, being confined to the specific areas of cable where maintenance is required.

Loss of Soil Resource

6.1.20 There is a potential for additional loss of soil resources to occur during any maintenance or remedial works which may be required; for example, through erosion, excess trafficking on plant wheels, or unauthorised export. Although the scale and extent of maintenance/remedial works and hence the potential scale of soil loss would be significantly less than for initial construction.

Agri-Environment Schemes

6.1.21 Impacts to AES are considered to be short-term and occur during the construction phase only. Therefore, longer term, operational and permanent effects have been scoped out of the assessment.

Decommissioning Effects

6.1.22 Due to the similar type and duration of works and the consequent potential impacts to soil resources, there is also a potential for effects to loss of agricultural land, loss of soil resources, disturbance to soil resources and AES at the decommissioning phase to be similar but no worse than at the construction phase. Therefore, the effects of decommissioning are not specifically addressed, but are considered to be the same as the temporary identified for construction.

6.1.23 It is acknowledged that during the predicted 40-year operational lifespan of the DC cables the Agriculture and Soils baseline does have the potential to alter due to changes in land use and farming practice. These changes may include, but are not limited to, the adoption or surrender of AES; and shift from pastoral to arable agricultural practices. Changes to the baseline may therefore be positive or negative.

6.1.24 There is the potential for long-term changes to the baseline due to climate change. These could potentially lead to alterations in agricultural land quality (ALC grade), for example through increased levels of soil wetness in the winter and increased droughtiness 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.

6.1.25 Although there is the potential for the baseline presented in this chapter to change over time; it is considered to provide a good representation of land use and agricultural conditions at the decommissioning stage; but it is acknowledged that further impact assessment may be required at that time.

6.2 Route Section 1: Proposed Landfall to Well High Lane

Temporary Impacts

Loss of Agricultural Land

6.2.1 During construction activities, there will be the temporary loss of approximately 57.0 ha of agricultural land within Route Section 1 working width, of which 48.1 ha (84.4 %) would be located on BMV agricultural land.

6.2.2 Within Route Section 1, there is one Primary TCC, one Secondary TCC and four TWAs, resulting in a temporary land take of 11.5 ha, all of which is located on BMV agricultural land.

6.2.3 As the significance criteria threshold of 20 ha of **permanent** BMV loss is not exceeded, this temporary loss is considered **not significant.**

6.2.4

Disturbance to Soil Resource

6.2.5 The construction activities may result in a temporary disturbance of the soil resource in Route Section 1. Works within the proposed DC cable working width would result in the disturbance of low (51.2 ha within the working width) and medium (1.8 ha) receptor sensitivity soil resources.

6.2.6 Whilst works within the TCCs and TWAs would result in the disturbance of soils of low (10.4 ha within the TCC or TWA sites) and medium (1.1 ha) sensitivity.

6.2.7 In the absence of appropriate handling and storage measures (mitigation) there is the potential for permanent irreversible or long-term reversible damage to the soil structure and soil quality (see Table 9.6); and the magnitude of impact would be **high** (Table 9.7). Therefore, the potential impact to the heavy textured **low sensitivity** soils would be **moderate** and the potential impact to the medium textured **medium sensitivity** soils would be **major**. Therefore, in the absence of mitigation, the potential effect of disturbance to the soil resource in Route Section 1 would be **moderate to major** and **significant (adverse)**.

Loss of Soil Resource

6.2.8 Although the working methodology is for the soils excavated within Route Section 1 to be stored on site and reinstated *in situ* post-construction with no soils being exported from site; in the absence of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, there is the potential for physical soil loss from Route Section 1 for example through erosion, inappropriate handling, inaccurate stripping, excess trafficking on plant wheels, or unauthorised export. This uncontrolled loss of soil would also increase biosecurity risk as described in paragraph 6.1.14. Additionally, there is the potential for soils to be rendered unsuitable for use in reinstatement (as described in paragraph 6.1.12) which also constitutes a loss of soil resource.

6.2.9 Therefore, in the absence of mitigation, there is potential for more than 5% of the soil resource to be lost or rendered unsuitable for reuse in Route Section 1. The magnitude of effects in the absence of appropriate mitigation would therefore be **low** (see Table 9.6).

6.2.10 Using the criteria in Table 9.7, in the absence of mitigation, the potential impact to the soils of **low sensitivity** would be **negligible** and the impact to the soils of **medium sensitivity** would be **low,** therefore the potential effect of soil loss would be **not significant**.

Agri-Environment Schemes

6.2.11 In the absence of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, there is the potential for the quality of the reinstatement to fall short of the requirements which would allow AES eligibility to be reinstated.

6.2.12 Land parcel 2343 is enrolled in an EHLS scheme and consequently is a **medium sensitivity** receptor (Table 9.5). Without appropriate mitigation, the parcel could experience a permanent change to AES eligibility (**high** magnitude of impact, Table 9.6); and the effect to the land parcel's AES eligibility would be **major** and **significant (adverse)**.

Longer Term, Operational and Permanent Impacts

Disturbance to Soil Resource

6.2.13 The disturbance of soil resources within Route Section 1 is largely restricted to construction; however, during the operational lifetime of the proposed DC cable route, there is a potential for additional disturbance (excavation) of soil resources to occur during any maintenance or remedial works which may be required. In the absence of appropriate handling and storage measures (mitigation), the magnitude of impact to the disturbed resources would be **high** (see Table 9.6). Therefore, the potential impact to **low sensitivity** soils would be **moderate** and the potential impact to **medium sensitivity** soils would be **major**. Therefore, in the absence of mitigation, the potential effect of disturbance to the soil resource in Route Section 1 would be **moderate to major** and **significant (adverse)**.

Loss of Soil Resource

6.2.14 During the operational lifetime of Route Section 1, in the absence of appropriate handling and storage measures (mitigation), there is a potential for additional loss of soil resources to occur during any maintenance or remedial works which may be required; for example, physical losses due to inappropriate handling, inaccurate stripping, excess trafficking on plant wheels, or unauthorised export. This uncontrolled loss of soil would also increase biosecurity risk as described in paragraph 6.1.14. Additionally, there is the potential for soils to be rendered unsuitable for use in reinstatement (as described in paragraph 6.1.12) which also constitutes a loss of soil resource. Although the scale and extent of maintenance/remedial works and hence the potential scale of soil loss would be significantly less than for initial construction, in the absence of appropriate mitigation, there is potential for more than 5% of soils excavated during these works to be lost or rendered unsuitable for reinstatement. The magnitude of effects in the absence of appropriate mitigation would therefore be **low** (see Table 9.6).

6.2.15 Using the criteria in Table 9.7, in the absence of mitigation, the potential impact to the soils of **low sensitivity** would be **negligible** and the impact to the soils of **medium sensitivity** would be **minor,** therefore the potential effect of soil loss would be **not significant**.

6.3 Route Section 2: Well High Lane to A16 (Keal Road)

Temporary Impacts

Loss of Agricultural Land

6.3.1 During construction activities, there will be the temporary loss of approximately 61.6 ha of agricultural land within the Route Section 2 proposed DC cable working width, of which approximately 52.9 ha (85.8%) would be located on BMV agricultural land (Table 9.13).

6.3.2 Within Route Section 2, there is one Secondary TCC and five TWAs, resulting in a temporary land take of 11.4 ha, of which 92.1% is likely to be located on BMV agricultural land (Table 9.13).

6.3.3 As the significance criteria threshold of 20 ha of permanent BMV loss is not exceeded, this is temporary loss is considered to be **not significant.**

Disturbance to Soil Resource

6.3.4 The construction activities may result in a temporary disturbance of the soil resource in Route Section 2. Works within the proposed DC cable working width would result in the disturbance of soils of low (18.7 ha within the working width), medium (20.4 ha) and high (22.5 ha) sensitivities.

6.3.5 The works within the TCCs and TWAs would result in the disturbance of low (1.7 ha of soils within the TCC or TWA sites), medium (3.3 ha) and high (6.3 ha) receptor sensitivity soil resources.

6.3.6 In the absence of appropriate handling and storage measures (mitigation), the magnitude of impact would be **medium** (see Table 9.6). In the absence of appropriate handling and storage measures (mitigation) there is the potential for permanent irreversible or long-term reversible damage to the soil structure and soil quality; and the magnitude of impact would be **high** (Table 9.7). The potential impact to the heavy textured soils of **low sensitivity** would be **moderate** and the potential impact to the medium and fine textured soils of **medium** and **high sensitivity** would be **major**. Therefore, in the absence of mitigation, the potential effect of disturbance to the soil resources in Route Section 2 would be **moderate** or **major** and **significant (adverse)**.

Loss of Soil Resource

6.3.7 Although the working methodology is for the soils excavated within Route Section 2 to be stored on site and reinstated *in situ* post-construction with no soils being exported from site; in the absence of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, there is the potential for physical soil loss from Route Section 2 for example through erosion, inappropriate handling, inaccurate stripping, excess trafficking on plant wheels, or unauthorised export. This uncontrolled loss of soil would also increase biosecurity risk as described in paragraph 6.1.14. Additionally, there is the potential for soils to be rendered

unsuitable for use in reinstatement (as described in paragraph 6.1.12) which also constitutes a loss of soil resource.

6.3.8 Therefore, in the absence of appropriate mitigation, there is potential for more than 5% of the soil resource to be lost or rendered unsuitable for reuse in Route Section 2. The magnitude of effects in the absence of appropriate mitigation would therefore be **low** (see Table 9.6).

6.3.9 Using the criteria in Table 9.7, in the absence of mitigation, the potential impact to the soils of **low sensitivity** would be **negligible** and the impact to the soils of **medium sensitivity** would be **minor,** therefore the potential effect of soil loss would be **not significant**. Whereas for soil of **high sensitivity,** the potential impact to would be **moderate significant (adverse)**.

Agri-Environment Schemes

6.3.10 In the absence of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, there is the potential for the quality of the reinstatement to fall short of the requirements which would allow AES eligibility to be reinstated.

6.3.11 Within Route Section 2, three land parcels (18964, 25970 and 16552) are enrolled in ELS schemes and consequently are of **low sensitivity**; and four land parcels (2218, 1224, 3472 and 7267) are enrolled in an EHLS and consequently are of **medium sensitivity** (Table 9.5).

6.3.12 Without appropriate mitigation any of these parcels which are impacted by the construction works could experience a permanent change to AES eligibility (**high magnitude** of impact, Table 9.6). The current proposed DC cable working width only impacts four of the land parcels (2218, 1224, 1896 and 25970), with the other three land parcels (3472, 7267 and 16552) being present within the ZoI, but unaffected by construction works. However, as there is flexibility for the working width and temporary working areas to move within the wider ZoI it is possible that design changes subsequent to the submission of the ES may result in direct impact to these AES, therefore to present a worst case it is assumed that all seven land parcels are impacted by construction works.

6.3.13 Therefore, in the absence of appropriate mitigation, for low and medium sensitivity AES the potential impact to AES eligibility would be **moderate** and **major significant (adverse).**

6.3.14 It is also important to note that land parcel 16552 also has land enrolled in an ELS in Route Section 3.

Longer Term, Operational and Permanent Impacts

Disturbance to Soil Resource

6.3.15 The disturbance of soil resources within Route Section 2 is largely restricted to construction activities; however, during the operational lifetime of the proposed DC cable route, there is a potential for additional disturbance (excavation) of soil resources to occur during any maintenance or remedial works which may be required. In the absence of appropriate handling and storage measures (mitigation), the magnitude of impact to the disturbed resources would be **high** (see

Table 9.6). Therefore, the potential impact to the soils of **low sensitivity** would be **moderate** and the potential impact to soils of **medium** and **high sensitivity** would be **major**. Therefore, in the absence of mitigation, the potential effect of disturbance to the soil resources in Route Section 2 would be **moderate** or **major** and **significant (adverse)**.

Loss of Soil Resource

6.3.16 During the operational lifetime of Route Section 2, in the absence of appropriate handling and storage measures (mitigation), there is a potential for additional loss of soil resources to occur during any maintenance or remedial works which may be required; for example, physical losses, due to inappropriate handling, inaccurate stripping, excess trafficking on plant wheels, or unauthorised export. This uncontrolled loss of soil would also increase biosecurity risk as described in paragraph 6.1.14. Additionally, there is the potential for soils to be rendered unsuitable for use in reinstatement (as described in paragraph 6.1.12) which also constitutes a loss of soil resource. Although the scale and extent of maintenance/remedial works and hence the potential scale of soil loss would be significantly less than for initial construction, in the absence of appropriate mitigation, there is potential for more than 5 % of soils excavated during these works to be lost (or rendered unsuitable for reinstatement). The magnitude of effects in the absence of appropriate mitigation would therefore be **low** (see Table 9.6).

6.3.17 Using the criteria in Table 9.7, in the absence of mitigation, the potential impact to soils of **low and medium sensitivity** would be **negligible and minor** and the potential effect of soil loss would be **not significant**. Whereas for soils of **high sensitivity** the potential impact to would be **moderate** and **significant (adverse)**.

6.4 Route Section 3: A16 (Keal Road) to River Witham

Temporary Impacts

Loss of Agricultural Land

6.4.1 During construction activities, there will be the temporary loss of approximately 86.4 ha of agricultural land within the Route Section 3 proposed DC cable working width, of which 81.2 ha (94.0%) would be located on BMV agricultural land.

6.4.2 Within Route Section 3, there is one Primary TCC, three Secondary TCCs and three TWAs, resulting in a temporary land take of 15.2 ha, all of which are located in BMV agricultural land (Grade 2).

6.4.3 As the significance criteria threshold of 20 ha of permanent BMV loss is not exceeded, this is temporary loss is considered to be **not significant.**

Disturbance to Soil Resource

6.4.4 All soil resources in Route Section 3 are **low sensitivity** receptors.

6.4.5 The works within the working width will result in the disturbance to 86.4 ha of soils of **low sensitivity** (Table 9.15).

6.4.6 The works within the TCCs and TWAs will result in the disturbance to 15.2 ha of soils of **low sensitivity** (Table 9.15).

6.4.7 In the absence of appropriate handling and storage measures (mitigation) there is the potential for permanent irreversible or long-term reversible damage to the soil structure and soil quality; and the magnitude of impact would be **high** (see Table 9.6). Therefore, although these soils are of **low sensitivity** to soil erosion, the potential impact to the medium to heavy textured soils found in Route Section 3 would be **moderate** and in the absence of mitigation, the potential effect of disturbance to soil resources would be **significant (adverse)**.

Loss of Soil Resource

6.4.8 Although the working methodology is for the soils excavated within Route Section 3 to be stored on site and reinstated *in situ* post-construction with no soils being exported from site; in the absence of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, there is the potential for the physical soil loss from Route Section 3 for example through erosion, inappropriate handling, inaccurate stripping, excess trafficking on plant wheels, or unauthorised export. This uncontrolled loss of soil would also increase biosecurity risk as described in paragraph 6.1.14. Additionally, there is the potential for soils to be rendered unsuitable for use in reinstatement (as described in paragraph 6.1.12) which also constitutes a loss of soil resource.

6.4.9 Therefore, in the absence of mitigation, it is estimated that there is potential for more than 5% of the soil resource to be lost from Route Section 3. The magnitude of effects in the absence of appropriate mitigation would therefore be **low** (see Table 9.6).

6.4.10 Using the criteria in Table 9.7, in the absence of mitigation, the potential impact to the soils of **low sensitivity** within Route Section 3 would be **negligible** and **not significant.**

Agri-Environment Schemes

6.4.11 In the absence of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, there is the potential for the quality of the reinstatement to fall short of the requirements which would allow AES eligibility to be reinstated.

6.4.12 Within Route Section 3, five land parcels (19270, 16552, 13957, 22985 and 23135) are enrolled in an ELS and consequently are of **low sensitivity**; two land parcels (11800 and 8174) are enrolled in an EHLS and consequently are of **medium sensitivity**; and one land parcel is enrolled in an Organic Entry plus Higher Level Stewardship Scheme (OEHLS) and consequently is a **high sensitivity** receptor (Table 9.5). All land parcels lie within the proposed DC cable route working width.

6.4.13 In the absence of appropriate mitigation, for low sensitivity AES the potential impact to AES eligibility would be **moderate**; whilst for the medium and high sensitivity AES the potential impact to AES eligibility would be **major** respectively. Therefore, the potential effect to AES eligibility across all AES registered land parcels would be **moderate** and **major,** and **significant (adverse).**

6.4.14 It is also important to note that land parcel 16552 also has land enrolled in an ELS in Route Section 2 and therefore has also been assessed in that section.

Longer Term, Operational and Permanent Impacts

Disturbance to Soil Resource

6.4.15 The disturbance of soil resources within Route Section 3 is largely restricted to construction; however, during the operational lifetime of the proposed DC cable route, there is a potential for additional disturbance (excavation) of soil resources to occur during any maintenance or remedial works which may be required. In the absence of appropriate handling and storage measures (mitigation), the magnitude of impact to the disturbed resources would be **high** (see Table 9.6). Therefore, the potential impact to the soils of **low sensitivity** would be **moderate** and **significant (adverse)**.

Loss of Soil Resource

6.4.16 During the operational lifetime of Route Section 3, in the absence of appropriate handling and storage measures (mitigation), there is a potential for additional loss of soil resources to occur during any maintenance or remedial works which may be required; for example, physical losses, due to inappropriate handling, inaccurate stripping, excess trafficking on plant wheels, or unauthorised export. This uncontrolled loss of soil would also increase biosecurity risk as described in paragraph 6.1.14. Additionally, there is the potential for soils to be rendered unsuitable for use in reinstatement (as described in paragraph 6.1.12) which also constitutes a loss of soil resource. Although the scale and extent of maintenance/remedial works and hence the potential scale of soil loss would be significantly less than for initial construction, in the absence of appropriate mitigation, it is estimated that there is potential for the loss of more than 5 % of soils excavated during these works (or rendered unsuitable for reinstatement). The magnitude of effects in the absence of appropriate mitigation would therefore be **low** (see Table 9.6).

6.4.17 Using the criteria in Table 9.7, in the absence of mitigation, the potential impact to soils of **low sensitivity** within Route Section 3 would be **negligible** and **not significant**.

6.5 Route Section 4: River Witham to the Proposed Converter Station

Temporary Impacts

Loss of Agricultural Land

6.5.1 During construction activities, there will be the temporary loss of approximately 60.4 ha of agricultural land within the Route Section 4 proposed DC cable working width, all of which would be located on BMV agricultural land (Table 9.20).

6.5.2 Within Route Section 4, there is one Primary TCC, two Secondary TCCs and six TWAs, resulting in a temporary land take of 8.8 ha, all of which would be located on BMV agricultural land.

6.5.3 As the significance criteria threshold of 20 ha of permanent BMV loss is not exceeded, this is temporary loss is considered to be **not significant.**

Disturbance to Soil Resource

6.5.4 All soil resources in Route Section 4 are **low sensitivity** receptors.

6.5.5 The works within the working width will result in the disturbance to 60.4 ha of soils of **low sensitivity** (Table 9.18).

6.5.6 The works within the TCCs and TWAs will result in the disturbance to 8.8 ha of soils of **low sensitivity** (Table 9.18).

6.5.7 In the absence of appropriate handling and storage measures (mitigation) there is the potential for permanent irreversible or long-term reversible damage to the soil structure and soil quality; and the magnitude of impact would be **high** (see Table 9.6). Therefore, although these soils are of **low sensitivity** to soil erosion, the potential impact to the heavy textured soils found in Route Section 4 would be **moderate** and in the absence of mitigation, the potential effect of disturbance to soil resources would be **significant (adverse)**.

Loss of Soil Resource

6.5.8 Although the working methodology is for the soils excavated within Route Section 4 to be stored on site and reinstated *in situ* post-construction with no soils being exported from site; in the absence of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, there is the potential for the physical soil loss from Route Section 4 for example through erosion, inappropriate handling, inaccurate stripping, excess trafficking on plant wheels, or unauthorised export. This uncontrolled loss of soil would also increase biosecurity risk as described in paragraph 6.1.14. Additionally, there is the potential for soils to be rendered unsuitable for use in reinstatement (as described in paragraph 6.1.12) which also constitutes a loss of soil resource.

6.5.9 Therefore, in the absence of mitigation, it is estimated that there is potential for more than 5% of soil resources to be lost from Route Section 4. The magnitude of effects in the absence of appropriate mitigation would therefore be **low** (see Table 9.6).

6.5.10 Using the criteria in Table 9.7, in the absence of mitigation, the potential impact to the soils of **low sensitivity** within Route Section 4 would be **negligible** and **not significant**.

Agri-Environment Schemes

6.5.11 There are no AES currently in place in Route Section 4, therefore there would be no impact to AES as a result of the construction works.

Longer Term, Operational and Permanent Impacts

Disturbance to Soil Resource

6.5.12 The disturbance of soil resources within Route Section 4 is largely restricted to construction; however, during the operational lifetime of the proposed DC cable route, there is a potential for additional disturbance (excavation) of soil resources to occur during any maintenance or remedial works which may be required. In the absence of appropriate handling and storage measures (mitigation), the magnitude of impact to the disturbed resources would be **medium** (see Table 9.6). Therefore, the potential impact to **low sensitivity** soils would be **minor** and **not significant**.

Loss of Soil Resource

6.5.13 During the operational lifetime of Route Section 4, in the absence of appropriate handling and storage measures (mitigation), there is a potential for additional loss of soil resources to occur during any maintenance or remedial works which may be required; for example, physical losses, due to inappropriate handling, inaccurate stripping, excess trafficking on plant wheels, or unauthorised export. This uncontrolled loss of soil would also increase biosecurity risk as described in paragraph 6.1.14. Additionally, there is the potential for soils to be rendered unsuitable for use in reinstatement (as described in paragraph 6.1.12) which also constitutes a loss of soil resource. Although the scale and extent of maintenance/remedial works and hence the potential scale of soil loss would be significantly less than for initial construction, in the absence of appropriate mitigation, it is estimated that there is potential for more than 5 % of soils excavated during these works to be lost (or rendered unsuitable for reinstatement). The magnitude of effects in the absence of appropriate mitigation would therefore be **low** (see Table 9.6).

6.5.14 Using the criteria in Table 9.7, in the absence of mitigation, the potential impact to **low** sensitivity soils within Route Section 4 would be **negligible** and **not significant**.

6.6 Overview of Pre-mitigation Effects

6.6.1 The summary of pre-mitigation effects for the DC cable route are listed in Table 9.21 and Table 9.22.

Table 9.21: Pre-mitigation Temporary Impacts: Agriculture & Soils (Proposed DC Cable Route)				
Description of Receptor	**Value / Sensitivity**	**Description of Pre-mitigation Effect**	**Significance**	**Significant**
Route Section 1: Proposed Landfall to Well High Lane				
Agricultural Land	NA	Temporary loss of BMV agricultural land.	NA	No
Disturbance to Soil Resources	Low-Medium	Incorrect handling and storage of soils during construction leading to damage to the structure, function and resilience of the soil resource.	Moderate adverse - Major adverse	Yes
Loss of Soil Resources	Low-Medium	Incorrect handling and storage of soils during construction resulting in more than 5 % of soil resources being lost or rendered unsuitable for reuse.	Negligible adverse - Minor adverse	No
Agri-Environment Schemes	Medium	Poor quality restoration after construction preventing re-eligibility for AES	Moderate adverse	Yes
Route Section 2: Well High Lane to A16 (Keal Road)				
Agricultural Land	NA	Temporary loss of BMV agricultural land.	NA	No
Disturbance to Soil Resources	Low-High	Incorrect handling and storage of soils during construction leading to damage to the structure, function and resilience of the soil resource.	Moderate adverse - Major adverse	Yes
Loss of Soil Resources	Low-High	Incorrect handling and storage of soils during construction resulting in more than 5 % of soil resources being lost or rendered unsuitable for reuse.	Negligible adverse - Minor adverse – Moderate adverse	Yes
Agri-Environment Schemes	Low-Medium	Poor quality restoration after construction preventing re-eligibility for AES	Minor adverse - Moderate adverse	Yes
Route Section 3: A16 (Keal Road) to River Witham				
Agricultural Land	NA	Temporary loss of BMV agricultural land.	NA	No
Disturbance to Soil Resources	Low	Incorrect handling and storage of soils during construction leading to damage to the structure, function and resilience of the soil resource.	Moderate adverse	Yes

Table 9.21: Pre-mitigation Temporary Impacts: Agriculture & Soils (Proposed DC Cable Route)				
Description of Receptor	**Value / Sensitivity**	**Description of Pre-mitigation Effect**	**Significance**	**Significant**
Loss of Soil Resources	Low	Incorrect handling and storage of soils during construction resulting in more than 5 % of soil resources being lost or rendered unsuitable for reuse.	Negligible adverse	No
Agri-Environment Schemes	Low-High	Poor quality restoration after construction preventing re-eligibility for AES	Moderate adverse	Yes
Route Section 4: River Witham to Proposed Converter Station				
Agricultural Land	NA	Temporary loss of BMV agricultural land.	NA	No
Disturbance to Soil Resources	Low	Incorrect handling and storage of soils during construction leading to damage to the structure, function and resilience of the soil resource.	Moderate adverse	Yes
Loss of Soil Resources	Low	Incorrect handling and storage of soils during construction resulting in more than 5 % of soil resources being lost or rendered unsuitable for reuse.	Negligible adverse	No
Agri-Environment Schemes	NA	Poor quality restoration after construction preventing re-eligibility for AES	NA	No

Table 9.22: Pre-mitigation long-term impacts: Agriculture & Soils (Proposed DC Cable Route)				
Description of Receptor	**Value / Sensitivity**	**Description of Pre-mitigation Effect**	**Significance**	**Significant**
Route Section 1: Proposed Landfall to Well High Lane				
Agricultural Land Quality and Land Use	NA	Permanent loss of BMV agricultural land will not exceed 20 ha.	NA	No
Disturbance to Soil Resources	Low-Medium	Incorrect handling and storage of soils during maintenance or remediation works leading to damage to the structure, function and resilience of the soil resource.	Moderate adverse - Major adverse	Yes

Table 9.22: Pre-mitigation long-term impacts: Agriculture & Soils (Proposed DC Cable Route)				
Description of Receptor	**Value / Sensitivity**	**Description of Pre-mitigation Effect**	**Significance**	**Significant**
Loss of Soil Resources	Low-Medium	Incorrect handling and storage of soils during maintenance or remediation works resulting in more than 5 % of soil resources within the working area being lost or rendered unsuitable for reuse.	Negligible adverse - Minor adverse	No
Route Section 2: Well High Lane to A16 (Keal Road)				
Agricultural Land Quality and Land Use	NA	Permanent loss of BMV agricultural land will not exceed 20 ha.	NA	No
Disturbance to Soil Resources	Low-High	Incorrect handling and storage of soils during construction leading to damage to the structure, function and resilience of the soil resource.	Moderate adverse - Major adverse	Yes
Loss of Soil Resources	Low-High	Incorrect handling and storage of soils during construction resulting in more than 5 % of soil resources being lost or rendered unsuitable for reuse.	Negligible adverse - Minor adverse – Moderate adverse	Yes
Route Section 3: A16 (Keal Road) to River Witham				
Agricultural Land Quality and Land Use	NA	Permanent loss of BMV agricultural land will not exceed 20 ha.	NA	No
Disturbance to Soil Resources	Low	Incorrect handling and storage of soils during maintenance or remediation works leading to damage to the structure, function and resilience of the soil resource.	Moderate adverse	Yes
Loss of Soil Resources	Low	Incorrect handling and storage of soils during maintenance or remediation works resulting in more than 5 % of soil resources within the working area being lost or rendered unsuitable for reuse.	Negligible adverse	No
Route Section 4: River Witham to Proposed Converter Station				
Agricultural Land Quality and Land Use	NA	Permanent loss of BMV agricultural land will not exceed 20 ha.	NA	No

Table 9.22: Pre-mitigation long-term impacts: Agriculture & Soils (Proposed DC Cable Route)				
Description of Receptor	**Value / Sensitivity**	**Description of Pre-mitigation Effect**	**Significance**	**Significant**
Disturbance to Soil Resources	Low	Incorrect handling and storage of soils during maintenance or remediation works leading to damage to the structure, function and resilience of the soil resource.	Moderate adverse	Yes
Loss of Soil Resources	Low	Incorrect handling and storage of soils during maintenance or remediation works resulting in more than 5 % of soil resources within the working area being lost or rendered unsuitable for reuse.	Negligible adverse	No

7 Mitigation

7.1 Overview of Mitigation

Design Mitigation

7.1.1 The design mitigation employed in relation to Agriculture and Soils is fully described in Route Section 3 paragraphs 3.1.1 to 3.1.2.

Construction Mitigation

7.1.2 To minimise damage to, and loss of, soil resources; and ensure that agricultural land is restored to the same quality (ALC grade) as prior to construction and to a level where AES eligibility is reinstated, good practice soil storage, handling and reinstatement methods (embedded mitigation measures) would be used as standard for all construction operations. These measures are set out in the outline Soil Handling and Storage Protocol (SHSP) which accompanies the application (document reference: VKL-08-39-G500-026). The document is based upon guidance such as Defra's Construction Code of Practice (Ref: 9-4) and MAFF's Good Practice Guide for Handling Soils (Ref: 9-14). See also paragraph 3.2.10. The embedded construction mitigation set out in the SHSP (Ref: 9-3) include, but are not limited to:

- Avoiding or limiting soil handling after periods of heavy rainfall or during periods when soils are waterlogged to minimise compaction and damage to soil structure;
- Limiting the number of machine movements within defined areas of the working width to minimise compaction and damage to soil structure;
- The establishment of vegetative cover, through seeding areas with bare soil surface once construction is complete to maintain and/or aid the recovery of soil structure and minimise the potential for soil loss through erosion. For arable land, in the absence of being able to re-enter the land into arable rotation upon restoration, areas of bare soil should be seeded with grass or a green manure crop, as informed through ongoing discussion between NGVL and landowners/tenant farmers. For pasture land, areas of bare soil should be seeded with grass crop, as informed through ongoing discussion between NGVL and landowners/tenant farmers;
- Ensuring the separate handling and storage of topsoils and subsoils (and distinct sub-horizons therein). Soil removed/excavated is stored near to its original location so it can be replaced/reinstated in a similar location; and.
- Reducing the potential for soil compaction through the use of Low Ground Pressure (LGP) tracked or wheeled tyres to spread the weight of vehicles, limiting the height of soil stockpile mounds, restricting construction traffic to specific areas on the construction working width and loosening the area afterwards using recognised practices and equipment to remove any compaction.

- Seeding the top of soil stockpiles if soil resources are stored for longer than six months to prevent irreversible damage to soil resource quality through factors such as erosion, and enable effective and quick restoration.

7.1.3 The damage to soil resource will be further minimised through the use of carefully designed haul roads to mitigate soil compaction (see paragraph 3.3.7), the installation of land drainage to intercept and divert clean water away from the working area; and managing the restored soils sympathetically.

7.1.4 It is essential that the 0.9 m minimum depth of cover is achieved over the cable infrastructure.

7.1.5 With the exception of Swaffham Prior soils identified in Route Section 2, the soils identified in the Proposed DC Cable Route are medium to heavy textured with a medium to low resilience to structural damage during handling. The moderate structural development of these soils requires careful management during handling and restoration, ideally restricted to the drier periods of the year when soils are not at field capacity, to avoid soil compaction and smearing and facilitate soil structural recovery once restored. This will enable the recovery of the natural soil drainage and return to a normal crop yield post construction. Detailed soil handling procedures will be provided in the SHSP.

7.1.6 The reinstated topsoil over the DC cable route should be cultivated using agricultural equipment and a crop established at the earliest opportunity. The early cropping of the restored land assists with the recovery of the soil structure through crop rooting whilst also minimising the risk of erosion.

7.1.7 The SHSP will be a 'live document' and prior to commencement of construction, site-specific soils data (from LDC or others) will be utilised to complete the SHSP to a detailed document containing site-specific mitigation which will be implemented during construction activities. The SHSP would also set out good practice measures to minimise the potential transfer of disease and pathogens, again making reference to guidance such as Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Ref: 9-4). This embedded mitigation would include, but not be limited to:

- Avoiding soil movement between land ownerships via heavy plant movement as far as is practicable in normal working operations, with additional tailored mitigation such as disinfectant spraying being employed should specific pathogens or diseases be identified (e.g. Foot and Mouth disease);
- Continued management of the displaced soil (soil storage mounds) with suitable herbicide application should control the weed seed burden in both the top- and sub-soil so as to avoid the increased growth of weeds (particularly harmful weeds such as black grass, thistles, ragwort) following soil replacement. The use of herbicide will be tailored to ensure that the certification of organic land is not adversely affected.

7.1.8 Appropriate Defra bio-security policies will provide appropriate measures in the event of any disease outbreaks or transfer of weeds between land ownerships. Prior to construction, Defra's Animal and Plant Health Agency should be consulted on the presence of animal burial pits, disease controls in place and the presence of notifiable plant disease.

7.1.9 The SHSP would be revised with site-specific data (if available) to further inform and tailor biosecurity measures.

7.1.10 Periodic stockpile inspections will be carried out along the DC cable route during construction activities to assess the condition of the stockpiles, and identify the requirement for weed control and or erosion mitigation measures. Details of the frequency of inspections and required information to consider will be listed in the SHSP. Furthermore, the good practice measures set out in the SHSP will ensure that wind erosion of soils (generation of dust emissions) during soil handling or from stockpiles will be minimised (Ref: 9-3).

7.1.11 To ensure organically managed land (as identified by land parcels currently enrolled in an organic ELS or Organic EHLS) retain organic status following construction, it is essential to implement mitigation beyond standard measures. These measures will be discussed in detail in the SHSP. This embedded mitigation would include, but not be limited to:

- Avoiding soil movement from one land ownership to another (e.g. via heavy plant movement and soil replacement, as described above).
- Continued management of the displaced soil (soil storage mounds). The use of herbicide will be tailored to ensure that the certification of organic land is not affected.

Other Measures

7.1.12 Site specific (bespoke) mitigation measures would be implemented where required. These measures could include changes to the grazing regime to accommodate the loss in workable area; construction of designated crossing points to minimise disruption to the movement of livestock and machinery; programming works to avoid specific locations (for example lambing sheds) during sensitive times in the farming calendar (for example lambing). The identification of these measures is the subject of ongoing discussion between the landowners/farmers within the ZoI, NGVL and ALOs; once identified these measures will be incorporated into project documentation (such as the detailed construction phase CEMP, site specific method statements, or similar).

7.1.13 As described in paragraph 0, soil erodibility is a measure of the susceptibility of soils to loss both *in-situ* (i.e. as an undisturbed soil profile) and during soil stockpiling. Three of the Soil Associations identified within the ZoI and temporary construction areas (Andover 1, Cuckney 2 and Swaffham Prior) are classed as being of high to moderate erodibility (Ref: 9-5) and are considered to be sensitive to damage and susceptible to loss. Therefore, additional bespoke mitigation may be required, tailored to the precise locations of these susceptible soils to ensure that they are protected from erosion.

7.1.14 Bespoke mitigation measures would be expected to include, but not necessarily be limited to: the use of specialist surface run-off control systems, the protection of stored soil from erosion using wind barriers, and the protection of in-situ, bare soil from erosion using covers. These measures would only be implemented following the identification of potential erosion on stockpiles during routine stockpile inspections.

7.1.15 Periodic stockpile inspections will be carried out along the DC cable route during construction activities to assess the condition of the stockpile, and identify the requirement for weed control and or erosion mitigation measures. This is discussed in further in detail in the Route Section specific sections and outlined in the SHSP.

Compensation Measures

7.1.16 The permanent loss of agricultural land is considered to be fully mitigated through the process of discussion and negotiation between NGVL, the landowners and any agricultural tenants (if applicable). It is considered that such negotiations have already reached a satisfactory stage whereby landowners and/or tenants will be reasonably compensated for all potential losses due to the permanent loss of land. Permanent loss of landholding is therefore not considered further within the assessment.

7.1.17 NGVL will ensure that agricultural liaison officers maintain communication with farmers/landowners to ensure their needs are understood before, during and after construction.

Route Section 1: Proposed Landfall to Well High Lane

7.1.18 The soils identified within the Route Section 1 include one erosion prone soil which may require bespoke mitigation/soil protection measures (Table 9.9). These soils were avoided as far as practicable as part of design mitigation and belong to the Andover 1 Soil Association. The desk based data show that this association covers 3.2% of the proposed DC cable working width, 3.1% of the ZoI to the south of Route Section 1, and 3.2% of the TCC and TWAs.

7.1.19 It is expected that prior to construction the detailed soil survey data collated by the LDC would be interrogated to define the extent of these soils at the field level. The range of bespoke mitigation measures which could be implemented would be expected to include, but not necessarily be limited to: the use of specialist surface run-off control systems, the protection of stored soil from erosion using wind barriers, and the protection of in-situ, bare soil from erosion using covers. These measures would only be implemented following the identification of potential erosion on stockpiles after routine inspections.

Route Section 2: Well High Lane to A16 (Keal Road)

7.1.20 The soils identified within the Route Section 2 include three erosion prone soils which may require bespoke mitigation/soil protection measures (Table 9.9). These soils were avoided as far as practicable as part of design mitigation and belong to the Andover 1, Cuckney 2 and Swaffham Prior Soil Associations.

7.1.21 The desk based data show that these erosion prone soils cover 69.7% of the proposed DC cable working width, 69.8% of the ZoI and 69.7% of the TCCs and TWAs within Route Section 2; and it is expected that prior to construction the detailed soil survey data collated by LDC would be interrogated to define the extent of these soils at the field level. The range of bespoke mitigation

measures which could be implemented would be expected to include, but not necessarily be limited to: the use of specialist surface run-off control systems, the protection of stored soil from erosion using wind barriers, and the protection of in-situ, bare soil from erosion using covers. These measures would only be implemented following the identification of potential erosion on stockpiles after routine stockpile inspections.

Route Section 3: A16 (Keal Road) to River Witham

7.1.22 There are no identified sensitive soils in Route Section 3.

7.1.23 One land parcel in Route Section 3 is currently enrolled in an organic AES and is therefore considered to be sensitive and requiring bespoke mitigation to ensure that the organic status of the land is not adversely affected. Alongside the standard mitigation measures to prevent potential pathogen and disease transmission between all agricultural land parcels, bespoke mitigation measures at organically managed land would be expected to include, continued organic-specific management, such as the use of herbicide will be tailored to ensure that the certification of organic land is not affected.

7.1.24 Periodic stockpile inspections will be carried out along Route Section 3 during construction activities. In the event of the identification of any erosion indicators in the stockpiles, bespoke mitigation measures may be applied.

Route Section 4: River Witham to the Proposed Converter Station

7.1.25 There are no identified sensitive soils in Route Section 4 and hence no bespoke mitigation measures are required in this Section. Periodic stockpile inspections will be carried out along Route Section 4 during construction activities. In the event of the identification of any erosion indicators in the stockpiles, bespoke mitigation measures may be applied.

8 Residual Effects

8.1 Introduction

8.1.1 This section sets out the effects of the proposed DC route with the mitigation measures set out in Section 7 in place as appropriate.

8.2 Route Section 1: Proposed Landfall to Well High Lane

Temporary Impacts

Disturbance to Soil Resource

8.2.1 Construction activities will result in a temporary disturbance to soil resources in Route Section 1. With appropriate mitigation measures, such as those set out in Section 7 and the SHSP, in place the soils would retain their structure, function, quality and resilience; and the magnitude of impact would be reduced to **negligible**. Therefore, the residual impact to the **low** and **medium sensitivity** soils within this Route Section would be **negligible** and **not significant.**

Loss of Soil Resource

8.2.2 The application of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, will prevent the unauthorised export of soils; minimise or prevent soil loss through erosion and trafficking on plant wheels; and ensure that soils are maintained in a state suitable for reuse during reinstatement, ensuring that over 95 % of soil resources will be retained on site and be suitable for reuse. The mitigation of loss of soil would also help ensure biosecurity by minimising the potential for the transfer of disease, pathogens and weeds. Therefore, with appropriate mitigation, the magnitude of effect would be **negligible** (Table 9.6), resulting in a residual effect that would be **negligible** and **not significant** (Table 9.7).

Agri-Environment Schemes

8.2.3 With appropriate mitigation in place, the loss of AES eligibility to the single low sensitivity AES in Route Section 1 would be temporary and regained upon reinstatement. The magnitude of impact to AES eligibility would therefore be **low** (Table 9.6) and the residual effect would be **negligible** and **not significant** (Table 9.7).

Longer Term, Operational and Permanent Impacts

Disturbance to Soil Resource

8.2.4 During the operational lifetime of the proposed DC cable route, there is a potential for additional disturbance (excavation) of soil resources to occur during any maintenance or remedial works

which may be required. With appropriate mitigation in place, the residual impacts to the **low** and **medium sensitivity** soils within this Route Section are therefore considered to be the same as the temporary (construction) impacts (**negligible** and **not significant,** see paragraph 8.2.1), although the scale and extent of works would be significantly less.

Loss of Soil Resource

8.2.5 During the operational lifetime of the proposed DC cable route, there is a potential for additional loss of soil resources to occur during any maintenance or remedial works which may be required. With appropriate mitigation in place, the residual within this Route Section are therefore considered to be the same as the temporary (construction) impacts (**negligible** and **not significant'** see paragraph 8.2.1), although the scale and extent of works would be significantly less.

8.3 Route Section 2: Well High Lane to A16 (Keal Road)

Temporary Impacts

Disturbance to Soil Resource

8.3.1 Construction activities will result in a temporary disturbance to soil resources in Route Section 2. With appropriate mitigation measures for the handling, storage and reinstatement of soils, such as those set out in Section 7 and the SHSP, in place, the soils would retain their structure, function, quality and resilience; and the magnitude of impact would be reduced to **negligible**. The residual impact to the **low** and **medium sensitivity** soils within Route Section 2 would be **negligible;** and the residual impact to the **high sensitivity** soils within Route Section 2 would be **minor** (Table 9.6). Therefore, the residual effect of disturbance to all soil resources within Route Section 2 would be **not significant** (Table 9.7).

Loss of Soil Resource

8.3.2 The application of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, will prevent the unauthorised export of soils; minimise or prevent soil loss through erosion and trafficking on plant wheels; and ensure that soils are maintained in a state suitable for reuse during reinstatement, ensuring that over 95 % of soil resources will be retained on site and be suitable for reuse. The mitigation of loss of soil would also help ensure biosecurity by minimising the potential for the transfer of disease, pathogens and weeds. Therefore, with appropriate mitigation, the magnitude of impact would be **negligible** (Table 9.6). The residual effect to the soils of **low** and **medium sensitivity** within Route Section 2 would be **negligible;** and the residual effect to the **high sensitivity** soils within Route Section 2 would be **minor** (Table 9.6). Therefore, the residual effect of loss of soil resources within Route Section 2 would be **not significant** (Table 9.7).

Agri-Environment Schemes

8.3.3 With appropriate mitigation in place, the loss of AES eligibility to the three low sensitivity and four medium sensitivity AES within Route Section 2 would be temporary and regained upon reinstatement. The magnitude of impact to AES eligibility would therefore be reduced to **low** (Table 9.6) and the residual impact would be **negligible** to **minor**. Overall the effect to AES in Route Section 2 would be **not significant** (Table 9.7).

Longer Term, Operational and Permanent Impacts

Disturbance to Soil Resource

8.3.4 During the operational lifetime of the proposed DC cable route, there is a potential for additional disturbance (excavation) of soil resources to occur during any maintenance or remedial works which may be required. With appropriate mitigation in place, the residual impacts to the soils of **low, medium and high sensitivity** within this Route Section are therefore considered to be the same as the temporary (construction) impacts (**negligible** or **minor** and **not significant,** see paragraph 8.3.1), although the scale and extent of works would be significantly less.

Loss of Soil Resource

8.3.5 During the operational lifetime of the proposed DC cable route, there is a potential for additional loss of soil resources to occur during any maintenance or remedial works which may be required. With appropriate mitigation in place, the residual within this Route Section are therefore considered to be the same as the temporary (construction) impacts (**negligible** or **minor** and **not significant,** see paragraph 8.3.2), although the scale and extent of works would be significantly less.

8.4 Route Section 3: A16 (Keal Road) to River Witham

Temporary Impacts

Disturbance to Soil Resource

8.4.1 Construction activities will result in a temporary disturbance to soil resources in Route Section 3. With appropriate mitigation measures for the handling, storage and reinstatement of soils, such as those set out in Section 7 and the SHSP, in place, the soils would retain their structure, function, quality and resilience; and the magnitude of impact would be reduced to **negligible**. Therefore, the residual impact to the **low sensitivity** soils within Route Section 3 would be reduced to **negligible** and the residual effect of disturbance to soil resources would be **not significant.**

Loss of Soil Resource

8.4.2 The application of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, will prevent the unauthorised export of soils; minimise or prevent soil loss through erosion and trafficking on plant wheels; and ensure that soils are maintained in a state suitable for

reuse during reinstatement, ensuring that over 95 % of soil resources will be retained on site and be suitable for reuse. The mitigation of loss of soil would also help ensure biosecurity by minimising the potential for the transfer of disease, pathogens and weeds. Therefore, with appropriate mitigation, the magnitude of effect would be reduced from minor to **negligible** (Table 9.6), resulting in a residual effect that would be **negligible.** There would be no change in the significance of the effect which would remain **not significant** (Table 9.7).

Agri-Environment Schemes

8.4.3 With appropriate mitigation in place, the loss of AES eligibility to the five low sensitivity; two medium sensitivity; and one high sensitivity AES within Route Section 3 would be temporary and regained upon reinstatement. The magnitude of impact to AES eligibility would therefore be reduced to **low** (Table 9.6). The residual effect to the low and medium sensitivity schemes would be reduced to **negligible** to **minor** and the effect would be **not significant** (Table 9.7). According to the criteria in Tables 9.6 and 9.7, this temporary change in AES eligibility would result in a moderate effect to the high sensitivity organically managed scheme, which would be significant. However, as the design, embedded and bespoke mitigation measures set out in Section 7 and the SHSP would ensure that the land was returned to the same quality and condition as prior to construction and the organic status of the land would be retained, post-construction there would effectively be no change in AES eligibility which is a negligible impact. Therefore, the effect to the high sensitivity organically managed AES would also be **not significant**.

Longer Term, Operational and Permanent Impacts

Disturbance to Soil Resource

8.4.4 During the operational lifetime of the proposed DC cable route, there is a potential for additional disturbance (excavation) of soil resources to occur during any maintenance or remedial works which may be required. With appropriate mitigation in place, the residual impacts to the **low sensitivity** soils within this Route Section are therefore considered to be the same as the temporary (construction) impacts (**negligible** and **not significant,** see Paragraph 8.4.1), although the scale and extent of works would be significantly less.

Loss of Soil Resource

8.4.5 During the operational lifetime of the proposed DC cable route, there is a potential for additional loss of soil resources to occur during any maintenance or remedial works which may be required. With appropriate mitigation in place, the residual within this Route Section are therefore considered to be the same as the temporary (construction) impacts (**negligible** and **not significant,** see Paragraph 8.3.2), although the scale and extent of works would be significantly less.

8.5 Route Section 4: River Witham to the Proposed Converter Station

Temporary Impacts

Disturbance to Soil Resource

8.5.1 Construction activities will result in a temporary disturbance to soil resources in Route Section 4. With appropriate mitigation measures for the handling, storage and reinstatement of soils, such as those set out in Section 7 and the SHSP, in place, the soils would retain their structure, function, quality and resilience; and the magnitude of impact would be reduced to **negligible**. Therefore, the residual impact to the soils of **low sensitivity** within Route Section 4 would be reduced to **negligible** and the residual effect of disturbance to soil resources would be **not significant.**

Loss of Soil Resource

8.5.2 The application of appropriate mitigation measures such as the good practice set out in the SHSP and Section 7, will prevent the unauthorised export of soils; minimise or prevent soil loss through erosion and trafficking on plant wheels; and ensure that soils are maintained in a state suitable for reuse during reinstatement, ensuring that over 95 % of soil resources will be retained on site and be suitable for reuse. The mitigation of loss of soil would also help ensure biosecurity by minimising the potential for the transfer of disease, pathogens and weeds. Therefore, with appropriate mitigation, the magnitude of impact would be reduced from minor to **negligible** (Table 9.6), resulting in a residual effect that would be **negligible.** There would be no change in the significance of the effect which would remain **not significant** (Table 9.7).

Longer Term, Operational and Permanent Impacts

Disturbance to Soil Resource

8.5.3 During the operational lifetime of the proposed DC cable route, there is a potential for additional disturbance (excavation) of soil resources to occur during any maintenance or remedial works which may be required. With appropriate mitigation in place, the residual impacts to the **low sensitivity** soils within this Route Section are therefore considered to be the same as the temporary (construction) impacts (**negligible** and **not significant,** see Paragraph 8.5.1), although the scale and extent of works would be significantly less.

Loss of Soil Resource

8.5.4 During the operational lifetime of the proposed DC cable route, there is a potential for additional loss of soil resources to occur during any maintenance or remedial works which may be required. With appropriate mitigation in place, the residual within this Route Section are therefore considered to be the same as the temporary (construction) impacts (**negligible** and **not significant,** see Paragraph 8.3.2), although the scale and extent of works would be significantly less.

9 Cumulative Effects

9.1 Introduction

9.1.1 Cumulative effects have been considered both in terms of the cumulative effects of the DC cable installation for the UK Onshore Scheme and the UK Offshore Scheme (Intra-project effects) and the accumulated effects of the proposed DC cable with other developments proposed in the vicinity (Inter-project effects).

9.2 Intra-Project Effects

9.2.1 Intra-project effects are considered as a result of the DC cable installation for the UK Onshore Scheme in combination with the UK Offshore Scheme.

9.2.2 There are no Agriculture and Soils receptors present in the UK Offshore scheme, therefore there will be no additional agricultural land take, disturbance to, or loss of soil resource or impact to AES in the UK Offshore scheme, therefore there are no Agriculture and Soils Intra-project effects between the DC cable installation for the UK Onshore Scheme in combination with the UK offshore Scheme.

9.2.3 Effects associated with Agriculture and Soils are not considered relevant to assessing the likely intra-project effects of various sources of impact upon single receptors; for example, the combined effects of noise, dust and visual effects on one receptor. There are thus no intra-project cumulative effects anticipated between land use, soil resources or AES; and other potential environmental effects which may occur as a consequence of the UK Onshore Scheme.

9.3 Inter-Project Effects

9.3.1 A list of 17 developments to be considered cumulatively with the UK Onshore Scheme has been agreed by NGVL, details of the schemes are presented in Table 9.23. The process of project development screening for cumulative assessment is detailed in Chapter 29 (ES-2-C.11).

9.3.2 As shown in Table 9.23, only five of the 17 considered developments would potentially result in the permanent loss of BMV land. None of the available project information for these five proposed developments provided a quantification of BMV and non-BMV coverage, and therefore to present a worst-case scenario, it is assumed that all land is of BMV quality.

9.3.3 The combined BMV loss for the five developments is therefore considered to be 47.1 ha. However, there is no permanent loss of BMV agricultural land due to the proposed DC cable installation for the UK Onshore Scheme. As a result, there is not a significant cumulative effect between the DC cable installation for the UK Onshore Scheme and the 17 considered developments.

9.3.4 Due to the spatial distribution of AES, it would not be expected for the 17 projects to impact the same AES, however as both projects have appropriate mitigation in place to ensure that AES eligibility is restored, the cumulative impact would be not significant should this occur.

9.3.5 Similarly, the assessment of disturbance to and loss of soil resources is also considered to be site specific; however, it is noted that there are three developments in which the development plans display either the access track (project ID 39 and 59) or an OHL (project ID 61), transecting the OL of the Proposed DC cable route. Therefore, there is potential for the same area of soils to be disturbed more than once.

9.3.6 However, it is noted that in order to conform with planning policy and good practice guidance, all developments would be expected to apply similar measures to ensure that the disturbance and loss of soil resources was reduced to a level where it was acceptable in planning terms; and land restoration would achieve a standard which would allow AES eligibility to be reinstated. For example, as a requirement of the Development Consent Order (DCO) Triton Knoll Electrical System have produced a SMP.

Table 9.23: Cumulative Permanent Loss of BMV land

Ref. No	Notes	Within the OL of the DC cable elements (Y/N)	Permanent BMV loss (ha)*
5	This project proposes the erection of a new grain store to be located immediately adjacent to the west of the proposed DC cable route, at Six Hundreds Drove, within the boundary of the Heckington Fen Wind Farm (replacing an existing building structure with a slightly larger building.)	N	0
6	This project comprises 22 wind turbines of a maximum height (to blade tip) of 125 m. This project is located to the immediate west of the proposed DC cable route north of the A17.	N	8.36
12	This project proposes to replace approximately 1.3 km of existing overhead power lines on wood poles to match existing circuits. This project would extend across the working width of the proposed DC cable route (in Route Section 4) at Sutterton Drove, Amber Hill.	N	0
20	This project is still in the pre-planning phase. It proposes the erection of up to eight poultry sheds on arable land. This project is located adjacent to project ID 23 (as described above), on the B1192 south of the proposed DC cable route. The sheds are likely to be 24.4 m x 91.4 m.	N	1.78

Table 9.23: Cumulative Permanent Loss of BMV land			
Ref. No	**Notes**	**Within the OL of the DC cable elements (Y/N)**	**Permanent BMV loss (ha)***
23	This project proposes the development of a 499 kW anaerobic digestion plant to be located adjacent to the B1192, approximately 300 m south of the proposed DC cable route.	N	0
26	This project proposes the erection of 16 biomass boilers and associated fuel silos for the heating of existing adjacent poultry units on existing hardstanding. This project is located to the north of the proposed DC cable route, immediately adjacent to the B1192 (a proposed access route to the proposed DC cable route).	N	0
39	This project proposes the installation of a solar farm consisting of up to 19,230 solar panels and an access track to the site from Folly Lane. The project access overlaps the proposed DC cable route north of the proposed TCC (S4) (in Route Section 3). An area of 8.26 ha of agricultural land would be temporarily lost, however sheep will be allowed to graze in between and beneath the solar panel arrays, therefore agricultural use has the potential to continue.	Y	0
44	This project includes for the development of three containers with flues, within which nine biomass boilers would be located along with associated buffer tanks (one per biomass boiler) on existing hardstanding. This project is located to the immediate west of the proposed DC cable route at Keal Cotes.	N	0
45	This project comprises the development of a poultry feed unit, as well as two silos (for feed) and an access road to the facility. This project is located adjacent to the proposed DC cable route at Keal Cotes (Route Section 3).	N	0.36
48	This project has submitted a Screening Opinion request for the development of a 2 MW solar park to be located southwest of Mavis Enderby. It is located approximately 900 m from the proposed DC cable route. An area of 4 ha of agricultural land would be temporarily lost during construction only. Land between and beneath the panel arrays would be	N	0

Table 9.23: Cumulative Permanent Loss of BMV land			
Ref. No	**Notes**	**Within the OL of the DC cable elements (Y/N)**	**Permanent BMV loss (ha)***
	returned to agricultural use during operation (grazed).		
49	This project includes for the installation of a solar array consisting of 460 122 kWp panels. The project is located approximately 800 m to the west of the proposed DC cable route, south of Sutterby (in Route Section 2). An area of 0.2 ha of agricultural land would be temporarily lost during construction only. Land between and beneath the panel arrays would be returned to agricultural use during operation (grazed).	N	0
50	This project proposes the development of 192 ground mounted solar panels on existing hardstanding located within close proximity (approximately 200 m) to the proposed DC cable route to the southwest of Ulceby Cross (in Route Section 2).	N	0
51	This project proposes the development of 6,000 PV solar panels with the capability of producing 1.5 MW of electricity on non-agricultural land located to the northeast of Driby Top and is approximately 800 to 900 m from the proposed DC cable route.	N	0
58	This project comprises the erection of an 11 kV overhead power line approximately 700 m to the north of the proposed DC cable route at its closest point. The project is approximately 3.1 km in length located north of Markby on the A1111. The land take from wood pole considered negligible.	N	0
59	This project proposes the development of a free range poultry unit as well as two silos for the storage of feed. An access road is also proposed to be developed. This project is located approximately 100 m from the south of the proposed DC cable route, to the west of the access point from Crawcroft Lane (in Route Section 1). Access will transect OL of the proposed DC cable element of the UK Onshore Scheme.	Y	0.32
61	This project comprises approximately 1 km of overhead power line on wood poles. The project is located immediately to the east of the A52 and	Y	0

Table 9.23: Cumulative Permanent Loss of BMV land			
Ref. No	**Notes**	**Within the OL of the DC cable elements (Y/N)**	**Permanent BMV loss (ha)***
	crosses the proposed DC cable route in a north-south axis to the eastern side of the proposed Temporary Construction Compound (TCC) (S1). The OHL will transect OL of the proposed DC cable element of the UK Onshore Scheme.		
67	The Triton Knoll Electrical System is the onshore component of the Triton Knoll Offshore Wind Farm, which consists of 288 wind turbines located approximately 32 km from Lincolnshire coast. The onshore component of the project consists of an underground cable connecting the offshore array to the National Electricity Transmission System (NETS) at the existing Bicker Fen 400 kV Substation.	N	36.30 ha
*None of the available project information provided a breakdown of permanent agricultural land loss into areas of BMV and non-BMV, therefore to present a worst-case scenario, it is assumed that all land considered for development is BMV land.			

10 Summary of Assessment

10.1 Summary

Overview of Baseline Conditions

10.1.1 Potential impacts to agricultural and soil receptors as a result of the proposed DC cable route have been identified, and could include the loss of agricultural land, the disturbance and loss of soil resources and the impact to AES eligibility.

10.1.2 Whilst these impacts cannot be avoided, with the implementation of suitable mitigation measures, the magnitude of effects can be reduced and the impacts can be managed.

10.1.3 Mitigation will be implemented through embedded construction measures in the SHSP, including best practice measures in accordance with the soil quality related industry good practice guidance (Ref: 9-4 and Ref: 9-14).The implementation of the SHSP will ensure the maintenance of soil volumes and soil quality during construction activities, with topsoil replaced to the same depths as the original soil profile; and subsoil replaced to the same depths as the original soil profile where possible owing to the placement of cable infrastructure to ensure that the ALC status of land is restored to the pre-commencement condition.

10.1.4 The short-term impacts on agricultural land quality and soil resource will be short-lived and can be fully mitigated by the adoption of best practice measures, ensuring the **residual temporary effects are not significant.**

Overview of Residual Effects

10.1.5 The summary of residual effects for the proposed DC cable route are presented in Table 9.21.

Residual Effects in East Lindsey District Council

10.1.6 There will be no significant residual effects on agriculture and soil receptors in ELDC.

Residual Effects in Boston Borough Council

10.1.7 There will be no significant residual effects on agriculture and soil receptors in BBC.

Residual Effects in North Kesteven District Council

10.1.8 There will be no significant residual effects on agriculture and soil receptors in NKDC.

Residual Effects in South Holland District Council

10.1.9 There will be no significant residual effects on agriculture and soil receptors in SHDC.

Overview of Cumulative Effects

Intra-project Effects

10.1.10 There will be no intra-project cumulative effects a result of the DC cable installation in combination with the UK Offshore Scheme.

Inter-project Effects

10.1.11 There will be no inter-project cumulative effects a result of the DC cable installation and the 17 considered developments.

Table 9.24: Summary of Assessment: Agriculture & Soils (Proposed DC Cable)				
Description of Receptor	**Value / Sensitivity**	**Description of Residual Effect**	**Significance**	**Significant**
BMV Agricultural Land	High	There is no residual effect	Adverse, Negligible	No
Disturbance to Soil Resource	Low, Medium and High	The residual effect is not significant	Adverse, Negligible	No
Loss of Soil Resource	Low, Medium and High	The residual effect is not significant	Adverse, Negligible	No
Agri-Environment Schemes	Low, Medium and High	The residual effect is not significant	Adverse, Negligible	No

11 References

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Ref: 9-3: NGVL Soil Handling and Storage Protocol, VKL-08-39-G500-026

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Ref: 9-5: Knox *et al.* (2015). 'Research to develop the evidence base on soil erosion and water use in agriculture: Final Technical Report. pp147'.

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Ref: 9-8: Soil Survey of England and Wales (1984) Soils and their Use in Eastern England and accompanying 1:250,000 map Sheet 4.

Ref: 9-9: Met Office (1989). Climatological Data for Agricultural Land Classification: Gridpoint datasets of climatic variables at 5km intervals for England and Wales.

Ref: 9-10: Multi-Agency Geographical Information for the Countryside (MAGIC) available on line @ www.magic.gov.uk, accessed 11 05 2017.

Ref: 9-11: Natural England strategic 1:250,000 scale Predictive 'Likelihood of best and most versatile land' mapping.

Ref: 9-12: Natural England (2012). Technical Information Note 049, 'Agricultural Land Classification: protecting the Best and Most Versatile agricultural land'.

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