

Cottam Solar Project

Environmental Statement Chapter 19: Soils and Agriculture Revision A

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Contents

19	SOILS AND AGRICULTURAL LAND	3
19.1	INTRODUCTION	3
19.2	LEGISLATION, PLANNING POLICY AND GUIDANCE	3
19.3	THE SCHEME	8
19.4	SCOPE OF THE ASSESSMENT	9
19.5	CONSULTATION	10
19.6	ASSESSMENT METHODOLOGY	13
19.7	SIGNIFICANCE CRITERIA	15
19.8	BASELINE CONDITIONS	18
19.9	POTENTIAL EFFECTS	22
19.10	MITIGATION AND LIKELY SIGNIFICANT RESIDUAL EFFECTS	26
19.11	CUMULATIVE EFFECTS	28
19.12	SUMMARY	29
19.13	REFERENCES	30

Issue Sheet

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Environmental Statement Chapter 19: Soils and Agriculture Revision A

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19 Soils and Agricultural Land

19.1 Introduction

19.1.1 This chapter provides an assessment of the likely significant Agricultural Land effects of the Scheme. Consideration is given within the chapter to the resources of agricultural land, the soil resource associated with that land, and the farm businesses operating at and around the Site.

19.1.2 The chapter provides a summary of relevant planning policy and guidance, and a description of the methodology adopted for the assessment. This is followed by a description of the relevant baseline conditions of the Site and the surrounding area, and an assessment of the potential effects of the Scheme during both construction and decommissioning, and during operation of the completed Scheme. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any adverse effects, following which a summary of the likely significant residual effects of the Scheme is provided, having regard to mitigation adopted. Some mitigation measures are embedded within the proposal rather than being a discrete measure added to it.

19.1.3 This chapter is supported by the following figures:

- **Figure 19.1** – Cottam 1 Agricultural Land Classification Grade Distribution;
- **Figure 19.2** – Cottam 2 Agricultural Land Classification Grade Distribution;
- **Figure 19.3** – Cottam 3a and 3b Agricultural Land Classification Grade Distribution;
- **Figure 19.4** – Farm Business Occupancy
- **Figure 19.5** – Predictive Best and Most Versatile Land Assessment

19.1.4 This chapter is supported by the following appendices:

- **Appendix 19.1:** Agricultural Land Quality, Soil Resources and Farming Circumstances [APP-145];
- **Appendix 19.2** - Outline Soil Management Plan [APP-146].

19.1.5 This chapter has been prepared by Daniel Baird Soil Consultancy Ltd (Baird Soil) (see Statement of Competence [APP-059]).

19.2 Legislation, Planning Policy and Guidance

Legislation and Planning Policy

19.2.1 This section outlines the policy context relating to agricultural land and its development. There is no legislation of specific relevance to a soils and agriculture assessment. Chapter 11 of the ES, Ground Conditions and Contamination [APP-046], deals with issues of contaminated land and the relevant legislation that is not specific to agriculture.

- 19.2.2 The National Planning Policy Framework¹ (updated July 2021) seeks to conserve and enhance the natural environment, paragraph 7 stating: *"The purpose of the planning system is to contribute to the achievement of sustainable development."*
- 19.2.3 Paragraph 174 lists six means by which planning policies should achieve this, a, b, e, and f being relevant to soils and agricultural land resource:
- "Planning policies and decisions should contribute to and enhance the natural and local environment by:
- a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);
 - b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services - including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;
 - c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;
 - d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
 - e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and
 - f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."
- 19.2.4 Further to paragraph 174, the footnote to paragraph 175 states that *"Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality."*
- 19.2.5 The glossary of the NPPF gives the following definition for best and most versatile (BMV) agricultural land: "Best and most versatile agricultural land: Land in grades 1, 2 and 3a of the Agricultural Land Classification".
- [**National Planning Statements \(NPS\) for Energy Infrastructure²**](#)
- 19.2.6 NPS's comprise the government's objectives for the development of nationally significant infrastructure in a particular sector. NPS for Energy Infrastructure are published by the Department of Business, Energy and Industrial Strategy. Paragraph 5.10.8 of the adopted overarching NPS for Energy (EN-1) states:-

“Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5) except where this would be inconsistent with other sustainability considerations. Applicants should also identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination.”

19.2.7 A draft EN-1 (September 2021) document preserves the above guidance in Paragraph 5.1.8. Additional guidance is given for previously developed sites and the recommendation that applicants should develop and implement a Soil Management Plan to minimise potential land contamination.

19.2.8 The adopted NPS for Renewable Energy Infrastructure (EN-3) was published in July 2011 and does not refer to Solar Farms or BMV land. A Draft EN-3 was published in September 2021, paragraphs 2.48.13 to 2.48.15 concerning Agricultural Land Classification (ALC) and solar development. Paragraph 2.48.13 concludes that although there is a preference for brownfield and low grade agricultural land over BMV, land type should not be a predominating factor in determining the suitability of the site location.

19.2.9 Paragraph 2.48.14 notes that the soils data gathered for ALC survey can inform soil management planning for solar development, and that soils data should also be obtained for soil management planning of the underground cabling and access routes. This paragraph does not direct that an ALC survey of cable and access routes should accompany a planning application.

19.2.10 Paragraph 2.48.15 notes that development of ground mounted solar arrays is not prohibited on BMV agricultural land.

Planning Practice Guidance³(PPG)

19.2.11 Paragraph 001 of the PPG Natural Environment guidance notes that the purpose of the ALC system is to enable informed choices to be made about farmland in the planning system. It reiterates the direction given by the NPPF that: *“Planning policies and decisions should take account of the economic and other benefits of the best and most versatile agricultural land.”*

19.2.12 Paragraph 002 concerns soils and states that: *“Soil is an essential natural capital asset that provides important ecosystem services – for instance, as a growing medium for food, timber and other crops, as a store for carbon and water, as a reservoir of biodiversity and as a buffer against pollution.”*

19.2.13 Paragraph 005 addresses Green Infrastructure. It states that: *“Green infrastructure is a natural capital asset that provides multiple benefits, at a range of scales. For communities, these benefits can include enhanced wellbeing, outdoor recreation and access, enhanced biodiversity and landscapes, food and energy production, urban*

cooling, and the management of flood risk. These benefits are also known as ecosystem services.”

19.2.14 Turning to the guidance specific to Renewable and Low Carbon Energy (published June 2015), the particular planning considerations that relate to large-scale ground-mounted solar photovoltaic farms are set out in Paragraph 013. The guidance relevant to soils and agriculture is:

- a preference for use of brownfield and non-agricultural land ahead of agricultural land;
- any use of agricultural land is shown to be necessary;
- poorer quality agricultural land used in preference to higher quality land; and
- continued agricultural use of land enabled.

19.2.15 The paragraph also notes *“that solar farms are normally temporary structures and planning conditions can be used to ensure that the installations are removed when no longer in use and the land is restored to its previous use;”*.

Local Planning Policy

Central Lincolnshire Local Plan – Adopted April 2017

19.2.16 For the District of West Lindsey, the April 2017 adoption of the Central Lincolnshire Local Plan replaced the district’s own former local plan along with those of City of Lincoln and North Kesteven District Councils⁴ and includes the policies for development in this area up to 2036.

19.2.17 The Central Lincolnshire Local Plan contains two policies that reference BMV agricultural land. The first is LP19: Renewable Energy Proposals. With specific reference to solar development it notes a presumption against solar farm proposals on the BMV agricultural land. Non-wind renewable energy development will be supported where the benefit of the development outweighs the harm caused and it is demonstrated that any harm will be mitigated as far as is reasonably possible. This policy goes on to state that *“Proposals will be supported where the benefit of the development outweighs the harm caused and it is demonstrated that any harm will be mitigated as far as is reasonably possible.”*

19.2.18 Policy LP55: Development in the Countryside, also references BMV agricultural land. Part G of this policy describes the criteria for permitting development proposals on BMV land outside of allocated sites. These are:

“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)."

Bassetlaw District Planning Policy

19.2.19 The western most grid connection crosses into Bassetlaw District. The Core Strategy for Bassetlaw District⁵ was adopted in December 2011. Policy DM10: Renewable and Low Carbon Energy, references BMV land. The relevant section of the policy states:

"A. Carbon Reduction

The Council will be supportive of proposals that seek to utilise renewable and low carbon energy to minimise CO2 emissions. Proposals for renewable and low carbon energy infrastructure will also need to demonstrate that they:
ii. will not lead to the loss of or damage to high-grade agricultural land (Grades 1 & 2);"

19.2.20 It should be noted however that the element of the proposed development that crosses into Bassetlaw district is only the grid connection, buried cable and electrical switchgear housing at the grid connection point. Solar panels would not be deployed within Bassetlaw District.

Technical Guidance

Technical Information Note 049: Agricultural Land Classification (ALC)

19.2.21 Natural England Technical Information Note 049 (TIN049) Agricultural Land Classification: Protecting the Best and Most Versatile Agricultural Land, provides guidance on the application of the Agricultural Land Classification Guidelines⁶, including survey methodology.

Code of Practice for the Sustainable Use of Soils on Construction Sites

19.2.22 The Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites⁷ provides guidance on the conservation of soil for beneficial reuse at development sites, safeguarding both the mass of the soil resource and its functional capacity. The application of this code of practice is voluntary, however it is referenced in the national Planning Practice Guidance at Paragraph 002. Following the guidance can deliver clear benefits in terms of the sustainable use of a finite soil resource, minimising the generation of waste and sediment from a construction site, and the cost effective delivery of the Scheme.

Farming Circumstances

19.2.23 The NPPF does not provide direction on the potential effect of development on individual farm businesses. In the absence of such guidance, the farming circumstances assessment in this chapter follows the advice given by the

superseded Planning Policy Guidance Note 7 (PPG7), and now broadly emulated by the Institute of Environmental Management and Assessment (IEMA) Guide: A New Perspective on Land and Soils in Environmental Impact Assessment⁸. In section 8.3.3 it notes the important considerations for economic and social effects for agriculture are;

- land use changes;
- the proportion of a holding affected by land-take;
- the effect on land management; access to land severed (particularly by linear infrastructure development); and
- the loss of farm buildings and infrastructure.

19.3 The Scheme

- 19.3.1 This Chapter considers the land comprising the Scheme which includes Cottam 1, Cottam 2, Cottam 3a and Cottam 3b (the 'Sites'); and the associated Cable Route Corridor. The extent of the Scheme is shown on the Site Location Plan [APP-005] and the Works Plans [AS-007]. The Scheme, which is assessed in this chapter, is described in Chapter 4 of the ES [EN010133/EX1/C6.2.4_A].
- 19.3.2 This section of this Chapter notes specific details of the proposal that have relevance to the potential impacts upon soils, agricultural land resource and farm businesses through construction, operation and decommissioning of the Scheme.
- 19.3.3 The proposed Scheme would comprise rows of Ground Mounted PV Modules. The frames would be secured by driving the legs into the ground to act as slim piles, with the exception of areas of high archaeological sensitivity, where they will sit on the surface secured with 'concrete feet'. The rows of panels are separated by clear ground to allow access for maintenance and to limit shading of panels. In addition, the mounting frame elevates the panel sufficiently that smaller livestock such as sheep can pass below and between rows.
- 19.3.4 Sufficient light passes through and between the panels to maintain a grass sward. It is desirable to maintain a green cover to promote rainfall infiltration and protect the soil surface from erosion. The length of the sward will be controlled by periods of sheep grazing and/or mowing. This will also prevent the establishment of shrubs and trees.
- 19.3.5 The Scheme will include substations and an Energy Storage Systems (sometimes referred to as 'BESS'), buried cabling within the sites, and other equipment and security fencing; and the buried Cable Route Corridor. The combined area of the tracks, substations and BESS will be approximately 47.9ha, a small fraction of the 1179.7ha area of the Sites, with the Ground Mounted PV Modules occupying the majority of the area. The substation and power storage facilities will be modular and placed on a concrete base. Access tracks and hard standing will be hardcore laid over a geotextile mat, following stripping and storing of the topsoil.

- 19.3.6 The Cable Route Corridor connects the separate areas of the Sites together and to the electrical distribution grid. The cable run below ground in a trench and sections of it may run through trunking which can be shared with grid connection for other facilities.
- 19.3.7 The Cable Route Corridor has not yet been subject to soil survey or farming circumstances assessment. This is as the narrow cable trench will need a specific survey along its actual path to inform soil management planning of the trenching works. Detailed ALC survey of fields places sample points at 100m intervals, too widely spaced to monitor soil variation within the soil to be excavated for the trench.
- 19.3.8 Agricultural occupancy and land use information for the Cable Route Corridor will need to be collected ahead of trenching work to avoid, where possible, an active construction site at sensitive periods of time for land management, for instance anticipated harvest dates. Any such information collected preplanning will lose validity and need to be replaced once an approximate work start date was established post consent.
- 19.3.9 It is anticipated that there will be limited impact of the Cable Route Corridor works on soils, agricultural land and farming activity. This is as the duration of cable laying works will be brief, without the need to transfer all soil material to then recover from soil storage bunds. The cable laying work will be similar to that for the existing routine practice of installing agricultural field drains, typically renewed after 40 years of operation.
- 19.3.10 The operational life of the Scheme is anticipated to be 40 years, following which it will be decommissioned. Decommissioning will remove the solar panels and their mounting frames, pulling up the steel legs from the ground. Below ground cabling within the sites will be excavated and removed from the Site. After removal of the energy storage the concrete bases will be removed. Lastly the hardcore for the tracks and hard standing will be removed for reuse, and the geotextile removed. For the grid connection cable route corridor, cables will be laid in ducts that may be shared with other generators. These ducts are therefore unlikely to be decommissioned with the solar farm.
- 19.3.11 With all structures removed and soil material replaced, it is anticipated that there will be no sterilisation of agricultural land following decommissioning work. All agricultural land can be restored without loss of extent or ALC grade. Defra research project Evaluation of Minerals Sites Restored to Agriculture (LE0206) Ref No. 12 demonstrates that agricultural land restoration is now routinely achieved at open cast and landfill sites without loss of ALC Grade, where the degree and extent of disturbance to the soil resource greatly exceeds that at a solar farm.

19.4 Scope of the Assessment

- 19.4.1 This chapter covers three key issues of relevance to Agricultural Land. Firstly, it considers the effects of the Scheme upon agricultural land as a resource, taking account of the land quality and versatility according to the Agricultural Land

Classification (ALC) Guidelines referred to above. Secondly, the effects of the Scheme upon the soil resource are considered. The soil differs from the land that is associated with in that it can be translocated. Lastly, it considers the effects of the Scheme upon farm businesses currently in operation upon the Site, and any effects the Scheme may have on the management of surrounding agricultural land.

- 19.4.2 The above effects typically occur at the construction stage of the Scheme. However, consideration is also given to any ongoing effects upon the agricultural land resource and farming activities once the Scheme is complete and operational, then following the decommissioning of the Scheme.
- 19.4.3 The ALC assessment is a quantitative assessment as it maps the extent of BMV land according to the prescribed ALC methodology. The assessment of likely effects upon a farm business is a qualitative assessment. The future management, marketplace or economic performance for a farm enterprise cannot be dictated or predicted.
- 19.4.4 The scope of the assessment meets the direction given by the NPPF, local planning policy, NPS and PPG, providing a detailed ALC assessment of the Sites, soils data for soil management planning within the sites, and farming circumstances for the agricultural businesses occupying the Sites. Informed by the detailed ALC results (contained in **Appendix 19.1**), the extent of the Sites has been modified to remove areas of BMV land.
- 19.4.5 Soils data and farming circumstances for the Grid Connection Route will be obtained post consent as a requirement of the DCO. This data has not been collected at the pre planning stage as the duration of the Grid Connection Route land take is short and the width of the corridor is narrow. Rather than grid survey of soil with a 100m spacing (as for a detailed ALC assessment) soil should be assessed

19.5 Consultation

- 19.5.1 A summary of consultation responses to date is provided in Table 19.2 below.

Table 19.2: Summary of Consultations

Consultee	Summary of response	How Response has been addressed
EIA Scoping Stage	Summary of response	How Response has been addressed
PINS – March 2022	<p>Scoping Report paragraph 22.4.1 proposes to assess impacts to agricultural land resources, soil resources and farming circumstances in the socio-economics, tourism and recreation and human health Chapter of the ES.</p> <p>The Inspectorate is content with this approach although the ES should</p>	<p>The Soils and Agriculture chapter addresses potential effects on agricultural land quality, farm businesses, and the soil resource with regard to its function of supporting crop production (Sections 19.9 and 19.10 below). Soil has other functions including</p>

	<p>signpost where effects to these receptors have been incorporated into the relevant Chapter assessments. Where impacts to soils and agricultural land is assessed in other relevant Chapters, this should include determining the degree and extent to which soils have been disturbed or damaged and any relevant mitigation measures employed to avoid/reduce impacts to soils; these should be secured via the DCO.</p>	<p>hydrological, cultural heritage and habitat. These soil functions and the potential effect on these soil functions are addressed in separate chapters of the ES.</p> <p>Mitigation measures that may impact across several soil functions are also addressed in each relevant ES chapter.</p>
<p>Lincolnshire County Council – response to EIA Scoping, 25 February 2022</p>	<p>Cumulative Impacts</p> <p>Consideration needs to be given to the other NSIP schemes in the area for solar farms (West Burton, Gate Burton and Heckington in North Kesteven). Whilst it is accepted that these schemes are also at the pre-application stage and full details are not yet available, indicative plans have been produced and therefore the ES should include commentary on the cumulative impacts on the topics included in the ES from the other solar schemes in the area particularly with regard to loss of agricultural land.</p>	<p>The identified solar farm proposals in the area do not yet have publicly available ALC field survey. In the absence of site assessment of ALC Grade, the cumulative impact on agricultural land quality is based upon the regional maps of Predictive BMV produced by Natural England (Section 19.11 below). These map agricultural land in high, moderate and low likelihood of BMV land for strategic use.</p>
<p>Statutory Consultation Stage</p>	<p>Summary of response</p>	<p>How Response has been addressed</p>
<p>Lincolnshire County Council July 2022 Statutory consultation stage response.</p>	<p>Loss of Agricultural Land – all arable land of whatever agricultural classification produces food, whether for animal feed or human consumption and this should be protected for its own sake. Within the project boundary there is land that is classed as the best and most versatile. The use of such land by this project would result in it being taken out of agricultural production for at least 40 years. Therefore, the use of the best and most versatile agricultural land by this project should be kept to an absolute</p>	<p>A detailed ALC assessment of the Sites has identified areas of BMV land. As detailed in Tables 5.6 to 5.9 of Chapter 5, Alternatives and Design Evolution, the extent of the Sites has been adapted to reduce the extent of BMV land included to only 4.1%</p> <p>Use of approximately 47.9ha (4%) of agricultural land within the Sites is proposed for the substation, BESS and</p>

	<p>minimum to reduce impact on UK food security.</p> <p>Cumulative impacts – this is an important issue given the number of other NSIP projects currently programmed across Lincolnshire which includes six other solar energy parks, and the need for a full assessment of environmental and social-economic impacts of the cumulative effects of the Cottam scheme in conjunction with these other projects. This must include all the other NSIPs in the West Lindsey District including the most recent Tillbridge Solar proposal that has not been taken into consideration in the preparation of the PEIR documents.</p>	<p>temporary access tracks which will not be available for continued agricultural use during the lifetime of the Scheme. Of this, only 4 ha comprises BMV which will be required for temporary access tracks (Para 19.9.2). The remainder of the land will continue to be agricultural land throughout the operational period.</p> <p>Agricultural land will remain available through the operational phase, managed as low input pasture that can be grazed by sheep.</p> <p>Food security is not a material planning consideration and UK annual balance of domestically produced food is sensitive to non-planning factors including weather and markets. The relevant assessment for policy purposes (and therefore decision-making purposes under the Planning Act 2008) is one that is based on the grade of the agricultural land, rather than its current use and the intensity of that use.</p> <p>As noted above the regional Predictive BMV plan is used to estimate the cumulative impact of other proposed solar renewable energy sites.</p>
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19.5.2 The Lincolnshire County Council consultation response is noted above and which states “... all arable land of whatever agricultural classification produces food, whether

for animal feed or human consumption...". Arable land is used for a variety of uses including for growing energy crops. Examples include fuel crops such as biodiesel and miscanthus grass, and energy substrate crops such as maize for anaerobic digestion, or grain for ethanol manufacture. There are no food security or planning policy constraints on growing these energy crops on arable land, just as there are no food security policy constraints on the use of agricultural land for solar PV. Studies have shown solar PV also produces more kWh per hectare than other renewable energy crops⁹. This is also achieved with land remaining in agricultural production, fattening lambs, and without the environmental and land degradation hazards of the most popular energy crop, maize¹⁰.

19.5.3 Arable land is also used to produce non-food crops for markets including industrial oils, cosmetics, pharmaceuticals and Christmas trees. Food security is not a material planning consideration. The relevant assessment for policy purposes is the ALC grade of the agricultural land, not its current use or the intensity of that use.

19.6 Assessment Methodology

Assessment of Agricultural Land Quality

19.6.1 ALC surveys have been undertaken on the agricultural land found within the Site. This work has been undertaken by two different survey teams. The ALC survey reports from these two teams are attached as annexes to the Agriculture Land Quality, Soil Resources and Farming Circumstances **Appendix 19.1**. The survey work of both teams follows the guidance given by Natural England in TIN049 for a detailed ALC assessment.

19.6.2 ALC guidelines and criteria require that the following factors be investigated:

- Climate: Average Annual Rainfall (AAR) and Accumulated Temperature above 0°C between January and June (AT0);
- Site: Gradient, Micro Relief and Flooding;
- Soils: Texture, Structure, Depth, Stoniness, and Chemical Toxicity; and
- Interactive Factors: Soil Wetness, Soil Droughtiness and Liability to Erosion.

19.6.3 Climatological data for ALC are provided for 5km intersections of the National Grid by the Meteorological Office, in collaboration with the National Soil Resources Institute. The data from these points is interpolated providing climate data for specific sites. Interpolated climate data has been calculated for six separate locations representative of the geographic spread of the Scheme Site.

19.6.4 The interactive factors of soil wetness, soil droughtiness and liability to erosion are assessed according to the ALC criteria from the climate and soil profile data.

19.6.5 The ALC methodology does not assess the fertility or economic value of farmland, or the quality of the current land management. It is deliberately limited to features of the land and soil that are beyond the practical influence of land management and

that can limit the versatility of land to support a range of different agricultural enterprises.

Assessment of Soil Resources

- 19.6.6 The Code of Practice for the Sustainable Use of Soils on Construction Sites recommends the use of the soil physical characteristics data, collected as part of an ALC survey, to identify topsoil and subsoil units for separate handling and beneficial reuse. This approach, used in this assessment, continues the practice that was used by the former MAFF ALC survey teams for minerals sites to advise on appropriate land restoration.
- 19.6.7 The ALC detailed survey data includes information on the depth, clay content and stoniness of topsoil and subsoil horizons, enabling the mapping of the extent of soil units appropriate for separate stripping, storage and beneficial reuse. The survey data is included with the ALC survey reports attached as annexes to **Appendix 19.1** of this ES. Mapping of soil units would form part of a Soils Management Plan that would be secured by a Requirement of the DCO. An Outline Soil Management Plan for the site is given at **Appendix 19.2** to this Chapter.

Farming circumstances

- 19.6.8 The assessment methodology for farming circumstances is taken from the IEMA publication, A New Perspective on Land and Soils in Environmental Impact Assessment. It broadly continues the guidance from the now superseded planning guidance PPG7 which had remained a common approach for EIA in England, and was for a time included in the Design Manual for Roads and Bridges.
- 19.6.9 Four farm businesses occupy the Sites. Information on the size and nature of these farm businesses has been obtained from the landowners' land agents. Additional farm businesses occupy land crossed by the Cable Route Corridor where the interruption to current land management is considerably shorter compared to land within the Sites. More detailed and contemporary information on specific cropping and timing of operations specific to the route of the Cable Route Corridor will need to be obtained to inform the final Construction Environmental Management Plan, to minimize issues of land severance from cable route works and make appropriate temporary access measures.

Limitations and Assumptions

- 19.6.10 As directed by TIN049, soil characteristics for the detailed ALC survey were gathered at sample points at 100m intervals. This limits the mapping of ALC grades to a scale of 1:10,000 and the calculation of extents to the nearest 0.1ha to avoid presenting spurious accuracy. The detailed ALC survey scale is appropriate for informing planning and EIA. However as with minerals and built development work, experienced excavator operators and monitoring by soil scientists may be required to identify localized variation in soil characteristics when excavating cable trenches and recovering topsoil from access tracks.

19.6.11 The two ALC survey teams have used differing methods of mapping the boundary between grade areas. The smaller survey area of Cottam 3b draws a curved line placed where the surveyor determined the grade boundary to lie. The larger area survey (Sites Cottam 1, 2 and 3a) has mapped grade distribution as one hectare squares. Where there are no prominent surface features, such as a distinct break of slope, to indicate the position of a grade boundary, both are acceptable techniques for defining grade extent at the detailed ALC scale but are apparent as a difference in presentation.

19.7 Significance Criteria

19.7.1 BMV agricultural land is considered to be a strategic, finite and irreplaceable national resource with longstanding policy to prevent the unnecessary loss of such land to non-agricultural development. Land in ALC Grades 1, 2 and 3a is considered to constitute BMV land. Paragraph 174 of the NPPF directs that planning should consider the economic and other benefits of the BMV agricultural land.

19.7.2 Although soil characteristics are an important factor of agricultural land quality, there are other factors including climate and topography, that are specific to the location. For all practical intents and purposes, agricultural land cannot be created or translocated, nor can a compensatory area of land have its ALC grade enhanced. There is therefore no viable potential for beneficial effect or mitigation with regard to agricultural land quality.

19.7.3 Land has a soil resource associated with it. This soil has a functional capacity that can be improved, degraded or lost (for instance as a result of contamination of soil) in addition to the potential for loss of the soil material itself. Some functions of soil, such as the preservation of cultural artefacts and the support of biodiverse habitats, are covered elsewhere in this ES, for example Ecology and Biodiversity (ES Chapter 9) [APP-044], Hydrology, Flood Risk and Drainage (ES Chapter 10) [APP-045], and Cultural Heritage (ES Chapter 13) [APP-048]. For this chapter, the function of the soil for agricultural production is the primary issue.

19.7.4 Soil is for all practical intents and purposes a non-renewable resource. Therefore, the preservation and beneficial reuse of this resource is desirable in its own right.

19.7.5 For farming circumstances, the sensitivity of individual farm enterprises can be highly specific to the nature of the effect. For instance, a dairy enterprise will have far greater sensitivity to temporary disruption of access than an arable enterprise. Effects of development on a farm business can extend beyond the extent of land lost for production, for instance the fragmentation of a field or holding, and the establishment of a new land use in close enough proximity to cause a nuisance (for instance dust generation impacting on forage palatability).

19.7.6 IEMA guidance provides guidance on receptor sensitivity for both soil resource and soil functions, with agricultural land quality being included referred to as the soil function of 'biomass production' – the growing of food, fiber and fuel. Tables 19.3

and 19.4 below summarise the IEMA suggested sensitivity of receptor and magnitude of change for agricultural land.

Table 19.3: Sensitivity of Receptor: Agricultural Land Resource

Sensitive/value of receptor	IEMA Criteria
Very High	ALC Grades 1 and 2
High	ALC Grade 3a
Medium	ALC Grade 3b
Low	ALC Grades 4 and 5

Table 19.4: Magnitude of Change: Agricultural Land Resource

Magnitude of change	IEMA Criteria
Major	Permanent loss of over 20ha
Moderate	Permanent loss of 5 to 20ha
Minor	Permanent loss of less than 5ha
No Change	No discernible loss of agricultural land

19.7.7 The 20ha threshold is an arbitrary area but has been in use for several decades. MAFF used the threshold of 20ha of BMV land to inform interventions in planning including use of independent call in powers. It should be noted that use of a fixed area as a threshold may not be applicable to all scales of development. In this instance the proposed development is in excess of 1100ha, with use of approximately 47.9ha of the land for the substation, BESS and temporary access tracks which will not be available for continued agricultural use during the lifetime of the Scheme. Of this 4ha is best and most versatile land, which will be used for temporary access track. Given that the development is not permanent and that all elements can be restored to agricultural land on decommissioning, there will be no permanent loss of agricultural land. It is therefore appropriate to diverge from the magnitude of change criteria given in Table 19.4.

19.7.8 The IEMA guidance provides suggested sensitivity and magnitude criteria for a range of other soil functions such as ecological habitat and archaeology, that are dealt with in their respective chapters of this ES. Development of agricultural land can impact the soil resource beyond loss of the agricultural resource. The soil resources sensitivity and magnitude criteria given below relate to soil disturbances from development such as the stripping, storage and respreading of soil, and structural degradation from the passage of plant. These are the activities that present the greatest risk of soil degradation in the construction, operation and decommissioning of a solar farm.

Table 19.5: Sensitivity of Receptor: Soil Resources

Sensitive/value of receptor	Example Criteria
Very High	Disturbing heavy textured soil in plastic condition
High	Disturbing medium textured soil in plastic condition
Medium	Disturbing medium textured soil in friable condition.
Low	Disturbing light textured soil in friable condition

Table 19.6: Magnitude of Change Criteria: Soil Resources

Magnitude of change	Example Criteria
High	Disposal of topsoil or loss of productive functional capacity e.g. land contamination (Adverse).
Medium	Loss of topsoil for agricultural production but retained for beneficial reuse, or degradation of productive capacity e.g. puddled topsoil (Adverse).
Low	Loss of subsoil for agricultural production but retained for beneficial reuse (Adverse).
Negligible	Marginal loss of soil material e.g. light erosion from construction easement (Adverse).

19.7.9 Tables 19.7 and 19.8 give example sensitivity and magnitude of change criteria for farming circumstances receptors. IEMA does not provide sensitivity of receptor or magnitude of change criteria for agricultural enterprises. Sensitivities of various agricultural enterprises vary markedly between different effects, for instance a livestock enterprise may have very high sensitivity to trespass with dogs, whereas an arable enterprise may be medium to low sensitivity. Assessors experience and judgement is required to identify the agricultural activities that are sensitive to the likely effects, and determine the appropriate sensitivity and magnitude of change. As noted above the sensitivities of certain farm enterprises can be highly specific to the nature of the change.

Table 19.7: Sensitivity of Receptor: Farming Circumstances

Sensitive/value of receptor	Example Criteria
Very High	Breeding livestock and stock with biosecurity restrictions
High	High value vegetable and fruit crops.
Medium	Dairy requiring daily collection of perishable milk.
Low	Housed livestock

Table 19.8: Magnitude of Change Criteria: Farming Circumstances

Magnitude of change	Example Criteria
High	Termination of a farm business (Adverse) Creation/expansion of primary farm enterprise (Beneficial)
Medium	Termination of a farm enterprise (Adverse) Creation/expansion of a farm enterprise (Beneficial)
Low	Constraint of a farm enterprise (Adverse) Enhancement of existing farm enterprise (Beneficial)
Negligible	Minor interruption to farm enterprise planning, such as delay to turning out livestock (Adverse) Temporary enhancement of existing farm enterprise (Beneficial)

Table 19.9: Effects Significance Matrix

Sensitivity of receptor	Very High	High	Medium	Low
Magnitude of change				
High	Major	Major-Moderate	Moderate	Moderate to Minor
Medium	Major-Moderate	Moderate	Moderate-Minor	Minor
Low	Moderate	Moderate-Minor	Minor	Minor
Negligible	Moderate-Minor	Minor	Negligible	Minor

19.7.10 Major and Moderate effects in Table 19.9 are considered to be **'Significant Effects'** for impact assessment.

19.8 Baseline Conditions

Existing baseline

19.8.1 **Appendix 19.1** provides details of the agricultural assessment work for the agricultural soil survey area. These details are summarised below.

Future Baseline

19.8.2 ALC grading is insensitive to land management, and should only change if there is a major intervention outside the scope of normal agricultural practice, for instance significant contamination of the soil with a persistent toxin. The future baseline of agricultural land quality is therefore effectively fixed.

- 19.8.3 Soil health under standard arable rotations, as found within the Sites, has become depleted, with soil organic matter falling towards a low equilibrium. For the future baseline, soil organic matter will continue to approach this low equilibrium.
- 19.8.4 Of the four farm businesses, Farm Business D is currently in the process of winding up an agricultural enterprise. Its dairy unit has been reduced in size in preparation for its planned cessation. The future baseline for Farm Business D will therefore not include the dairy enterprise, with land likely to be increasingly managed by third parties as the farm owners retire.

Agricultural Land Resources

- 19.8.5 The detailed ALC surveys of the Sites found agricultural land in grades 2, 3a and 3b. Grade 3b predominates, with Grades 2 and 3a being relatively limited in extent. No land was found at the detailed scale of survey that could be mapped as ALC Grades 1, 4 or 5. Table 19.10 below shows the extent of ALC Grades found by the detailed survey covering the agricultural soil survey area. The distribution of ALC grades for the Sites is shown on **Figures 19.1, 19.2 and 19.3.**

Table 19.10: ALC Grade Distribution within the Cottam Sites

ALC Grade	Area (ha)	Area (%)
Grade 2	6.1	0.5
Grade 3a	42.0	3.6
Grade 3b	1118.3	94.8
Not Surveyed	13.3	1.1
Total	1179.7	100.0

- 19.8.6 Soil wetness is the predominant limiting factor for ALC grades across the Sites. Clayey subsoil impedes the drainage of excess water down through the soil profile. This leaves the soil seasonally waterlogged.
- 19.8.7 The majority of soil profiles found within all of the Sites have a heavy textured topsoil. When wet this material is highly vulnerable to prolonged structural degradation (smearing, poaching and rutting) from mechanical disturbance such as cultivator blades, tractor wheels and livestock hooves. The combination of restricted drainage, climate and topsoil clay content limits opportunities for cultivation and carrying livestock, with this restriction being sufficient to limit the land to ALC Grade 3b on soil wetness and workability.
- 19.8.8 Some areas of the Site have soil with a similarly impeded drainage but a topsoil that has a lower clay content and/or a significant presence of naturally occurring calcium carbonate (chalk and limestone). This topsoil is more resilient to structural degradation and as a result the soil wetness and workability limitation is to Grade 3a. Pockets of Grade 3a land are found in the Cottam 1, 2, 3a and 3b areas of the Sites.

- 19.8.9 Grade 2 land is also found within the Site. Typically, this land has soils with a slowly permeable subsoil (as with the Grade 3a and 3b land) but which is found at a greater depth. This land is subject to slight seasonal waterlogging and is limited to Grade 2 by soil wetness and workability. Pockets of Grade 2 land are found in the Cottam 1 and Cottam 3a areas of the Sites.
- 19.8.10 An ALC assessment has not been undertaken for the Cable Corridor Route. This is as the development proposed is a buried cable, with the interruption of the existing agricultural use limited to the brief cable laying operation.

Soil Resource

- 19.8.11 The soil resource within the Sites is predominantly heavy textured (high clay content) topsoil and subsoil.
- 19.8.12 Topsoil and subsoil material differ in their organic matter content. The higher organic matter in topsoil improves soil structure, porosity and moisture retention as well as providing nutrients for plant growth. It is therefore of greater value as a growth medium than the underlying subsoil. This organic matter also makes the topsoil more vulnerable to becoming anaerobic (reduced oxygen conditions detrimental to plant root growth) if aeration is restricted, such as by flooding, compaction or burying in a storage bund.
- 19.8.13 The majority of land within all of the Sites is under conventional arable management with ploughing each year for crop residue incorporation, weed control and preparation of a seed bed. The loosening and inversion of soil aerates it, speeding the metabolization of organic matter sufficiently that the topsoil organic matter will continue to decline to a low equilibrium irrespective of the quantity of additional organic matter that can be practically applied to the land.
- 19.8.14 There has not yet been a soil resource assessment for the cable route corridor. A dedicated soil survey of the corridor will be undertaken as part of an agreed Soil Management Plan. Detailed ALC survey, as used to provide soil resource data for the Sites, places sample points on a 100m grid. This survey methodology would be unsuitable for the narrow Cable Route Corridor.

Farming Circumstances

- 19.8.15 Four farm businesses occupy land within the Sites as shown on **Figure 19.4**. Baseline information for each of these has been gathered through interviews with the farmers and landowner's land agents. Farming Circumstances information has not yet been collected for the Cable Route Corridor. To minimise disruption to agricultural operations by cable laying works, cropping and occupancy information on the cable route will need to be current, for instance the specific crop in each field and critical dates for that crop. Farming Circumstances information collected pre planning would need to be replaced before cable trenching work plans could be finalised.

- 19.8.16 Farm Business A shown of **Figure 19.4** owns and occupies an area of approximately 132.3ha within the Sites at Cottam 2, part of a larger 562ha agricultural land holding spread across three farm units. All of this is arable land apart from a small grass paddock. This farm business uses contractor services from local providers for all landwork (cultivation, sowing, application and harvest). It does not operate any agricultural machinery and does not employ any farm workers.
- 19.8.17 Each of the three farm units for Farm Business A have stores for dry grain but no grain drying facilities. The stores are sufficient for the harvest in an average year.
- 19.8.18 Land within the Site is not currently entered into any environmental scheme but areas had previously been in the Higher Level Scheme (HLS). Agricultural land management options are not constrained by environmental factors (for instance by the presence of a Site of Special Scientific Interest) or by nuisance such as flytipping.
- 19.8.19 Farm Business B shown on **Figure 19.4** owns and occupies an area of approximately 1620ha, of which 937.4ha are within the Sites at Cottam 1. The majority of this land is in arable cropping with approximately 270ha of grassland used to graze and fatten 300 beef cattle each year.
- 19.8.20 Farm Business B undertakes the majority of its own arable landwork using its own machinery and labour, the farm employing seven full time positions, with occasional additional seasonal work. Contractor services are limited to baling of hay and straw, along with some load sharing with nearby farm businesses as circumstances dictate.
- 19.8.21 The farm runs a commercial shoot, but this does not require use of land that is required for the proposed Scheme.
- 19.8.22 There is a Scheduled Ancient Monument (SAM) but this is situated on land outside of the proposed Scheme. Land within the Site is in a mid-tier Countryside Stewardship scheme due to end in December 2022. The farm will not therefore face any penalty for early termination of Countryside Stewardship agreements. The farm experiences little nuisance from flytipping and hare coursing but this is in part owing to the vigilance of the farm workers including a game keeper.
- 19.8.23 Farm Business C shown on **Figure 19.4** is the owner-occupier of approximately 344ha split across two units at Blyton and Kirton. The Blyton unit has 77.9ha of land within the Sites at Cottam 3a whereas the Kirton unit has no land in or adjacent to the Sites. This land is predominantly arable with only approximately 16ha under pasture. It is managed with four full time staff.
- 19.8.24 Land at the Kirton unit benefits from winter abstraction licences for over 40,000 cubic metres that is stored in the farm's own reservoirs for irrigation in the growing season. Access to this irrigation water enables the inclusion of high value crops such as potato in the crop rotation. Economic production of such crops strongly favours access to irrigation because crop quality is dependent on an elevated and controlled moisture content, in contrast to grain which is harvested as dry as possible. Land within the Sites is not irrigated and has no connection to the reservoirs.

- 19.8.25 Existing diversified enterprises for Farm Business C include letting out parts of the old runway for motorsport, a small wind turbine (80kW) and a small area of solar PV (46kW). These diversified enterprises use land outside of the Sites and will not be constrained by construction and operation of the Sites. At present the farm does not have land entered into environmental schemes.
- 19.8.26 Farm Business D shown on **Figure 19.4** occupies approximately 364ha. Most of this land is owner-occupied including all of the 163.4ha of land within the Sites at Cottam 3a and 3b. Two small areas of approximately 24ha each are leased, the first on a secure, full agricultural tenancy and the second on an informal arrangement with the landowner.
- 19.8.27 The farm has a dairy unit with 150 milking cows plus approximately 200 youngstock. In addition, the farm has an arable enterprise with arable rotations including ley grass and whole crop maize among the combinable crops. The farm does not manage any fields as permanent pasture, instead grazing cattle on the ley grass rotation and storing grass and maize as silage. Some barley is also retained as feed. Most work is undertaken using the farm's own staff and machinery, but contractors are used for maize harvesting.
- 19.8.28 Five full time and two part time workers are employed by Farm Business D. Three of the full time workers are owners of the farm. Two of these owners and one more full time worker are at retirement age.
- 19.8.29 The dairy unit has a milking parlour suitable for 200 milking cows. The farmer states that the herd has been deliberately reduced from 200 to 150 to cut workload and as a step towards terminating the dairy enterprise entirely. The farm business does not plan to continue the dairy enterprise because of imminent retirements, the difficulty in retaining experienced dairy workers and the economic push toward larger dairy units.
- 19.8.30 The farm business does not currently have land entered in environmental stewardship agreements or have other environmental constraints on its operation. With the decreasing dairy herd size, disposal of livestock waste on the available land is easily achieved. Nuisances such as fly-tipping and dogs worrying livestock are not a significant problem for the farm.
- 19.8.31 Each of the four farm businesses managing agricultural land within the Sites is the owner occupier of that land. This means that the farm business will receive income from the lease of the land for the duration of the Scheme.
- 19.8.32 Existing agricultural enterprises can continue on remaining land that is securely held by the farm businesses. The only loss of a significant farm enterprise will be the dairy unit of Farm Business D, which will be terminated whether or not the Scheme progresses. On decommissioning the farms can resume arable management of land that has benefited from a sustained fallow period.

19.9 Potential Effects

Construction Effects

Agricultural Land Resource

- 19.9.1 Construction work will start the temporary curtailment of arable production within the Site. Construction work is described in detail in Chapter 4 of this ES. With specific regard to agricultural land the predominant works will entail laying temporary access tracks (hardcore on geotextile after topsoil stripped and stored), mounting solar panels on narrow steel piles and laying cables in trenches. In areas of archaeological sensitivity piles will be replaced by concrete feet sitting on the surface, with cables suspended from the solar mounts. The land does not cease to be agricultural land if cropping or grazing is suspended while construction work is taking place.
- 19.9.2 Substation, power storage facilities and temporary track will cover the soil surface for the minor area they occupy, approximately 47.9ha (4%) within the 1179.6ha area of the Sites. Of this area only 4.0ha will be best and most versatile land, and occupied by temporary tracks.
- 19.9.3 The majority of the agricultural land resource within the Sites is ALC Grade 3b (94.8%). Sensitivity of the agricultural land resource is Medium according to the IEMA suggested criteria. The use of 47.9ha by the substations, BESS and temporary tracks will not be able to remain in agricultural use during the lifetime of the Scheme, is greater than 20ha which by the IEMA suggested criteria would be a major magnitude of change. However as this 47.9ha area is 4% of the extent of the Sites and predominantly Grade 3b land, the magnitude of change is assessed to be Minor.
- 19.9.4 The resulting effect of the construction work on the Agricultural Land Resource will therefore be a Minor Impact, not significant.

Soil Resource

- 19.9.5 Solar panel construction work will involve trafficking the land in a similar manner to the current arable land use where high axle load vehicles like combine harvesters and grain trailers are regularly used. Heavy plant use will include excavators for digging trenches and cranes for placing substation and storage modules. The degree of soil compaction will depend upon a number of factors including vehicle weight, use of low ground pressure tyres/tracks, use of temporary protective surfaces, number of vehicle movements, soil texture and soil moisture content.
- 19.9.6 The Soil Management Plan is considered to be embedded mitigation. This will limit trafficking over and handling of soil following rainfall until soil moisture content has fallen below the plastic limit. It will also specify the depth of topsoil stripping operations to avoid incorporation of subsoil, and appropriate design and management of topsoil storage bunds within the site. These measures will conserve the functional capacity of both stripped and undisturbed soils for supporting agricultural production.

19.9.7 Medium textured topsoil in a friable condition has a medium sensitivity, and with all topsoil retained for beneficial reuse, the magnitude of change is low.

19.9.8 The resulting short term, reversable and local effect of construction disturbance on the soil resource within the Sites will be a Minor Impact, not significant.

Farming Circumstances

19.9.9 As for the agricultural land resource, the start of construction work will mark the start of the temporary curtailment of arable management at the Sites for each of the four Farm Businesses. While construction work is taking place the land will not be available for grazing livestock either.

19.9.10 The sensitivity of the arable enterprises of the four farm businesses to a reduction in cropped area will be medium. With the arable enterprises constrained rather than terminated, the magnitude of change is low.

19.9.11 The resulting short term, reversable and local effect of construction disturbance on the farm businesses occupying land within the Sites will be a Minor Impact, not significant.

Operational Effects

Agricultural Land Resource

19.9.12 During the operational phase of the development there will be no loss of agricultural land resource. With no change there will be Negligible Impact, not significant.

Soil Resource

19.9.13 While the Scheme is operational, the soil resource at the Site will remain under a perennial green cover. Benefits to the soil resource during the operational period of green cover with no ploughing will include:

- No bare soil surfaces vulnerable to wind and water erosion;
- Improved infiltration of rainwater reducing erosive surface water runoff (see section 10.8 in the Hydrology, Flood Risk and Drainage Chapter 10 of the ES);
- Greater exploitation of subsoil by perennial plant roots, improving drainage and loosening compacted subsoils; and
- Recovery of topsoil organic matter to a higher equilibrium, improving aggregate stability, water holding capacity and plant nutrient availability.

19.9.14 By facilitating a recovery in topsoil organic matter, this enforced fallow period will enhance the functional capacity of the soil resource for future arable production. Additional benefits from the recovery of soil organic matter include carbon sequestration and hydrological function but this assessment centers on the soil's functional capacity for agricultural production.

- 19.9.15 The benefit of recovery of soil functional capacity for agricultural production is of medium magnitude, with the clay loam textured topsoil having high sensitivity to this change.
- 19.9.16 The soil resource will therefore experience a medium term, reversible, local effect of Moderate Impact, a significant beneficial effect.

Farming Circumstances

- 19.9.17 During operation, grass below and between the solar panels will need to be managed. This management can include grazing by livestock where appropriate.
- 19.9.18 All four farm businesses will receive income from the Scheme's occupation of their land, a new diversified enterprise. This diversified enterprise will provide a new income stream independent of variations in profitability of arable production.
- 19.9.19 The sensitivity of the farm businesses to this creation of a new farm enterprise will be medium (beneficial) with the magnitude of change being medium. For the operational phase there will be a reversible moderate impact, a significant beneficial effect for the medium term.

Decommissioning Effects

Agricultural Land Resource

- 19.9.20 Decommissioning work will allow the land to be managed for arable production again after an extended fallow period of low input grassland. All piles and surface 'feet' securing solar panels will be removed along with buried cables within the Sites. No obstructions will be left in the soil that could interfere with cultivation. No changes to the physical characteristics of the land or the soil associated with it will have taken place that could influence ALC Grade. For instance, there will be no change in topography, soil depth, clay content or subsoil permeability.
- 19.9.21 Removal of hard standing and access tracks will be followed by reinstatement of the stripped and stored topsoil to restore this agricultural land.
- 19.9.22 With no loss of agricultural land the magnitude of change is no change. There will be Negligible Impact, not significant.

Soil Resource

- 19.9.23 As for construction, decommissioning will involve trafficking the land in a similar manner to the current arable land use where high axle load vehicles like combine harvesters and grain trailers are regularly used. Heavy plant use will include excavators for digging out cable trenches and cranes for removing substation and storage modules.
- 19.9.24 The Soil Management Plan is considered to be embedded mitigation. This will limit trafficking over and handling of soil following rainfall until soil moisture content has fallen below the plastic limit. It will also specify the depth of topsoil reinstatement.

These measures will conserve the functional capacity of both reinstated and undisturbed soils for supporting agricultural production.

- 19.9.25 Medium textured topsoil in a friable condition has a medium sensitivity, and with all topsoil retained for beneficial reuse, the magnitude of change is low.
- 19.9.26 The resulting short term, reversable and local effect of construction disturbance on the soil resource within the Sites will be a Minor Impact, not significant.

Farming Circumstances

- 19.9.27 Decommissioning of the Scheme will allow a return to arable management of the land. As is currently the case, the actual management of the farmland (arable, pasture, horticulture etc.) is a decision for farm managers based upon the prevailing market conditions, opportunities and regulatory environment. There is no obligation for land to return to arable production just as at present there is no obligation to maintain arable production.
- 19.9.28 Arable enterprises will have a medium sensitivity to any change in managed area with the magnitude of change being low.
- 19.9.29 The resulting short term, reversable and local effect of decommissioning on the return of agricultural land to the farm businesses will be a Minor Impact, beneficial and not significant.

19.10 Mitigation and Likely Significant Residual Effects

Embedded Mitigation

- 19.10.1 A Soil Management Plan (SMP) will be agreed as a requirement of a Development Consent Order. An outline SMP is provided as **Appendix 19.2** to the Environmental Statement. The aim of the SMP is the preservation of the soil resource at the site - avoiding both the loss of soil material from the site and the loss of soil functional capacity at the site. The SMP provides guidance to achieve this aim through the construction, operational and decommissioning phases of the development, covering the appropriate selection of plant, physical characteristics of the soil and safe removal of all below ground features (including piles and cables) at decommissioning that could interfere with subsequent cultivation. Measures identified in the SMP are also incorporated into **C7.3_A Outline Landscape and Ecological Management Plan [EN010133/EX1/C7.3_A]**. This guidance can be incorporated into agreed and detailed Construction, Operational, Decommissioning and Landscape and Ecological management plan documents prior to construction of the Scheme.

Construction Effects

Agricultural Land Resource

- 19.10.2 There is no effective mitigation for the loss of BMV agricultural land, and there is no actual loss of agricultural land resource. Therefore, the residual effect of the construction of the Scheme will remain minor, not significant.

Soil Resource

- 19.10.3 The outline SMP (**Appendix 19.2**) is an embedded mitigation that aims to conserve the soil resource through construction activity. No additional mitigation is proposed.
- 19.10.4 Therefore the residual effect of the construction phase remains minor, not significant.

Farming Circumstances

- 19.10.5 There are no mitigation measures specific to the farm businesses for the Construction Phase of the Scheme, so the impact will remain minor, not significant.

Operational Effects

Agricultural Land Resource

- 19.10.6 There is no loss of agricultural land in the operational phase of the development, and no mitigation proposed. The residual effect remains a Negligible Impact, not significant.

Soil Resource

- 19.10.7 The outline SMP (**Appendix 19.2**) is an embedded mitigation that aims to conserve the soil resource through construction activity. No additional mitigation is proposed.
- 19.10.8 the residual effect remains a Moderate Impact, a significant beneficial effect.

Farming Circumstances

- 19.10.9 Opportunities for farm enterprises to utilize the land within the sites will be limited to periods of grazing small livestock. No further mitigation is proposed. The residual effect will remain a moderate impact, a significant beneficial effect.

Decommissioning Effects

Agricultural Land Resource

- 19.10.10 No agricultural land will be lost to the decommissioning works, and no mitigation is proposed. The residual effect remains a Negligible Impact, not significant.

Soil Resource

- 19.10.11 The Outline Soil Management Plan measures also apply to decommissioning and land restoration works, with advice specific to the decommissioning phase covering the appropriate handling of stored soil material as it is returned, appropriate aftercare of the land, and the identification and remediation of any areas of compacted subsoils. The Soil Management plan is however an embedded mitigation and no further mitigation is proposed.
- 19.10.12 The residual effect will remain a Minor Impact, not significant.

Farming Circumstances

- 19.10.13 Decommissioning work will return agricultural land in the Sites to the arable enterprises of the occupying farm businesses. No further mitigation is proposed. The residual effect will remain a Minor Impact, beneficial and not significant.

19.11 Cumulative Effects

- 19.11.1 **Figure 19.5** shows the extent of the Order Limits superimposed on an extract of the regional plan of Predictive BMV Land Assessment¹¹. This series of 1:250,000 scale maps display the likelihood of BMV agricultural land in three broad categories, alongside non agricultural land urban land. These categories are High Likelihood of BMV (> 60% area BMV), Moderate Likelihood of BMV (20% to 60% area BMV) and Low Likelihood of BMV (< 20% area BMV). As can be seen the Order Limits occupy an area mapped as Moderate Likelihood of BMV.
- 19.11.2 **Figure 19.5** also shows the approximate extent of six solar renewable energy sites where planning applications have not yet been submitted. These sites are Tillbridge Solar, Gate Burton Energy Park, West Burton Solar, Heckington Fen Solar, Temple Oaks Renewable Energy Park and Mallard Pass Solar. The Heckington Fen site is shown within an area of High Likelihood of BMV land. Mallard Pass predominantly occupies an area of Low Likelihood of BMV land. The four remaining sites occupy predominantly Moderate Likelihood of BMV land as for the Cottam Solar Project Order Limits.
- 19.11.3 The explanatory note that accompanies the map series notes that the plans are not suitable for site specific assessment. Site specific assessment is required to determine ALC Grade for an individual site. However in the absence of such assessment results in the public domain, these plans indicate the general disposition of land quality within a region, and provide the best published reference to assess likely cumulative impact on the agricultural land resource.
- 19.11.4 No meaningful data is available to appraise farming circumstances for these six cumulative sites. Limited soils data is available at the 1:250,000 scale on the national soil map. However detail of soil information available from this national soil map is insufficient to justify any variation between the cumulative sites in predicted effect of a solar farm development on the Soil Resource.
- 19.11.5 For the Loss of Agricultural Land Resource, all six cumulative effect sites will be temporary with any actual loss of agricultural land limited to the small extent of switchgear housings and substations. Therefore the residual effect of each of these six sites on the agricultural land resource is predicted to be negligible, as for Cottam.
- 19.11.6 The soil resource present at each of the six cumulative sites will experience little disturbance, and the risk of compaction from trafficking reduced (lower frequency, lower weight and able to avoid wet conditions) when compared to annual arable crop management. Therefore the residual effect of each of these six sites on the soil resource is predicted to be negligible, as for Cottam.

19.11.7 Some farm businesses occupying land within the six cumulative sites may have elevated sensitivity to a solar farm development in comparison to the four farm businesses at Cottam. For instance a farm business may have a full agricultural tenancy providing security of tenure which if obliged to vacate, would be very difficult to replace. However without any published detail on the occupancy of the six cumulative sites, there is no justification to claim any greater significance of effect than at Cottam. Therefore the residual effect of each of these six sites on farm businesses is predicted to be negligible, as for Cottam.

19.11.8 The only plausible interaction between the six cumulative sites and Cottam is agricultural occupancy by a farm business across multiple different sites. If this does occur it is likely to not be a significant adverse effect for that farm business, but an assessment would not be possible without the farming circumstances baseline for the affected unit. There will be no interaction of impact for soils or agricultural land resource between any of the sites. There is therefore no significant cumulative effect identified for soils and agriculture for the six cumulative sites.

19.12 Summary

19.12.1 The potential effects, mitigation and significance of likely significant residual effects is described in Table 19.11 below.

Table 19.11: Summary of Potential Effects and Residual Effects

Description of Effect	Potential Effect	Mitigation	Residual Effect
Construction			
Loss of Agricultural Land Resource	Minor. Not Significant.	none	Minor. Not Significant.
Loss and Degradation of the Soil Resource	Minor. Not Significant.	none	Minor. Not Significant.
Loss of Land to Farm Businesses	Minor. Not Significant.	none	Minor. Not Significant.
Operation			
Loss of Agricultural Land Resource	Negligible. Not Significant.	None	Negligible. Not Significant
Recovery of Soil Health Under Extended Fallow	Moderate Beneficial, Significant	None	Moderate Beneficial, Significant
New Diversified Enterprise	Moderate Beneficial, Significant	none	Moderate Beneficial, Significant

Decommissioning			
Loss of Agricultural Land Resource	Negligible. Not Significant	none	Negligible. Not Significant
Loss and Degradation of the Soil Resource	Minor. Not Significant	none	Minor. Not Significant
Return of Land to Farm Businesses	Minor Beneficial. Not Significant	none	Minor Beneficial. Not Significant

19.13 References

- Ref.1 National Planning Policy Framework
<https://www.gov.uk/government/publications/national-planning-policy-framework-2#history>
- Ref.2 National Policy Statements for Energy Infrastructure. Department of Energy and Climate Change. <https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure>
- Ref.3 Central Lincolnshire Local Plan, Adopted April 2017 <https://www.n-kesteven.gov.uk/central-lincolnshire//>
- Ref.4 TIN049. Agricultural Land Classification: Protecting the Best and Most Versatile Agricultural
- Ref.5 Bassetlaw District Adopted Core Strategy December 2011
<https://www.bassetlaw.gov.uk/planning-and-building/planning-services/planning-policy/core-strategy-and-development-policies/core-strategy-adopted-development-plan/what-is-the-core-strategy/>
- Ref.6 Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land. MAFF 1988.
<http://archive.defra.gov.uk/foodfarm/landmanage/land-use/documents/alc-guidelines-1988.pdf>
- Ref.7 Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. Defra 2011 <https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites>
- Ref.8 A New Perspective on Land and Soil in Environmental Impact Assessment. IEMA, February 2022.

- Ref.9 Geyer, R et al: Spatially Explicit Life Cycle Assessment of Sun-to-Wheels Transportation Pathways in the US (*Environ. Sci. Technol.*, 2013, 47 (2), pp 1170–1176)
- Ref.10 Defra Future Farming – Manage Maize to Reduce Runoff and Erosion.
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