HELIOS RENEWABLE ENERGY PROJECT

Preliminary Environmental Information Report

Volume 2: Main Text and Figures

Chapter 14: Soils & Agricultural Land

October 2023

14. Soils and Agricultural Land

14.1.1. This chapter of the PEIR reports on the preliminary assessment of the likely significant effects of the Proposed Development with respect to agricultural land, soils and agricultural businesses.

14.1.2. The agricultural assessment has been undertaken by Kernon Countryside Consultants Ltd ('KCC') and the Agricultural Land Classification ('ALC') has been undertaken by Amet Property Ltd.

14.1.3. This chapter is supported by the following figures:

- Figure 14.1: Extract from Provisional ALC Map;
- Figure 14.2: Extract from Likelihood of BMV Map;
- Figure 14.3: Extract from the ALC Plan;
- Figure 14.4: Extract from the ALC Plan;
- Figure 14.5: Extract from the ALC Plan;
- Figure 14.6: Map of Farm Land Within the Site;
- Figure 14.7: Solar PV Panel Design; and
- Figure 14.8: ALC of Substation Area.

14.1.4. The following appendices are referred to in this chapter:

- Appendix 14.1: ALC of the Site;
- Appendix 14.2: Farm Reports;
- Appendix 14.3: Outline Soil Management Plan; and
- Appendix 14.4: Analysis of UK Food Security.

14.2. Planning Policy Context

National Planning Policy

14.2.1. National planning policy that has been considered comprises the following designated and draft National Policy Statements ('NPS'):

- Overarching NPS for Energy (EN-1) (July 2011) ('NPS EN-1')[1];
- Revised (Draft) Overarching NPS for Energy (EN-1) (March 2023) ('Revised (Draft) NPS EN-1')[2];
- NPS for Renewable Energy Infrastructure (EN-3) (July 2011) ('NPS EN-3')[3]; and
- Revised (Draft) NPS for Renewable Energy Infrastructure (EN-3) (March 2023)[4].

14.2.2. The relevant text from each NPS is presented below.

NPS EN-1

14.2.3. Paragraph 5.10.8 of the NPS EN-1 advises that applicants should seek to minimise impacts on best and most versatile ('BMV') agricultural land (comprising land in Grades 1, 2 and 3a of the agricultural land classification ('ALC') and preferably use land in areas of poorer agricultural quality (comprising land in Grades 3b, 4 and 5). Applicants should seek to minimise impacts on soil quality, taking account of any mitigation measures proposed.

Revised (Draft) NPS EN-1

14.2.4. Paragraph 5.11.3 notes that undeveloped greenfield land may need to be used for many forms of energy infrastructure. Paragraph 5.11.12 advises that the use of BMV land should be minimised, with a preference for use of poorer quality land.

NPS EN-3

14.2.5. NPS EN-3 (July 2011) does not provide any guidance for solar energy development.

Revised (Draft) NPS EN-3

14.2.6. The Revised (Draft) NPS EN-3 section 3.10 "Solar Photovoltaic Generation" sets out at paragraph 3.10.14 that while land type should not be a predominating factor in

[1]Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf Accessed June 2023

[2]Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf Accessed June 2023

[3]Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/37048/1940-nps-renewable-energy-en3.pdf Accessed June 2023

[4]Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147382/NPS_EN-3.pdf Accessed June 2023

determining the suitability of the site's location for renewable energy development, where the use of agricultural land has been shown to be necessary, poorer quality land should be preferred to higher quality land, avoiding BMV agricultural land where possible.

14.2.7. Paragraph 3.10.15 advises that the development of ground mounted solar arrays is not prohibited on land of ALC Grades 1, 2 or 3a, but the impacts must be considered.

14.2.8. Further advice is provided as follows:

- Soil stripping and handling (paragraph 3.10.72): noting that topsoil and subsoil should be stripped, stored and replaced separately to minimise soil damage and to provide optimal conditions for site restoration;
- Drainage and watercourses (paragraph 3.10.77): noting that given the temporary nature of solar PV farms, sites should be configured so as to minimise impacts on existing drainage systems;
- Biodiversity relative to intensive agricultural use (paragraph 3.10.80): noting that solar farms have the potential to increase the biodiversity value of a site, especially if the land was previously intensively managed; and
- Mitigation and soil preservation (paragraph 3.10.118): cross-referencing Defra's Construction Code of Practice for the Sustainable Use of Soils (2009)[5] and advising on mitigation measures to minimise soil carbon loss and maximise soil biodiversity.

14.2.9. Paragraph 3.10.136 advises that the Secretary of State ('SoS') should take into account the economic and other benefits of BMV agricultural land. The SoS should ensure that the applicant has put forward appropriate mitigation measures to minimise the impacts on soils or soil resources.

National Planning Policy Framework

14.2.10. The National Planning Policy Framework ('NPPF') (September 2023) is relevant as it defines the "best and most versatile" agricultural land (BMV) at Annex 2.

[5] Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, Defra (September 2009). Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/716510/pb13298-code-of-practice-090910.pdf Accessed: September 2023

Local Planning Policy

14.2.11. In April 2023, North Yorkshire Council ('NYC') became the administrative authority in which the Site is located, following its creation as a unitary authority by combining several district councils, including Selby District Council ('SDC'), the administrative area within which the Site had previously been located. The planning policy of SDC is still relevant to the Proposed Development.

14.2.12. The planning policy for SDC is contained within the Selby District Council Core Strategy Local Plan (October 2013)[6], the saved policies of the Selby District Local Plan (2005)[7], and the Selby District Council Publication Local Plan (August 2022)[8]. The Selby District Core Strategy (October 2013) does not contain any policies in relation to the development of agricultural land. The renewable energy policy SP17 contains no criteria relating to agricultural land. Emerging policy in the Publication Local Plan Consultation (August 2022) references avoiding BMV where possible (Policy SG4 A1) and avoiding Grade 1 unless there are exceptional circumstances (Policy SG4 A2). Non-BMV land should be preferred (B).

Legislation

14.2.13. There is no specific legislation relevant to the assessment of agricultural effects from a proposed development.

14.3. Assessment Methodology

14.3.1. The scope of this chapter follows the methodology presented in the EIA Scoping Report submitted to the Planning Inspectorate ('PINS') (Appendix 2.1 of the PEIR) and PINS' adopted EIA Scoping Opinion (Appendix 2.2 of the PEIR).

14.3.2. This assessment has taken into consideration the Institute of Environmental Management and Assessment's ('IEMA') *'A New Perspective on Land and Soil in Environmental Impact Assessment'* (2022) [9] (the 'IEMA Guidance') which comprises best practice guidance for the assessment of the likely significant effects on soils

[6] Available at: https://www.northyorks.gov.uk/planning-and-conservation/planning-policy/planning-policy-your-local-area/selby-planning-policy/selby-development-plan/selby-core-strategy-2013/selby-district-core-strategy-local-plan Accessed: July 2023

[7] Available at: https://www.northyorks.gov.uk/planning-and-conservation/planning-policy/planning-policy-your-local-area/selby-planning-policy/selby-development-plan/selby-district-local-plan-2005 Accessed: July 2023

[8] Available at: https://selby-consult.objective.co.uk/kse/event/37045 Accessed: July 2023

[9] Available at: https://www.iema.net/resources/blog/2022/02/17/launch-of-new-eia-guidance-on-land-and-soils Accessed: July 2023

and agricultural land from a proposed development.

Study Area

14.3.3. The following study areas have been used:

- In terms of context for the agricultural land quality implications, the England-wide and NYC administrative areas have been considered;
- In terms of potential effects on agricultural land quality and soils, the boundary of the Site has been considered; and
- In terms of agricultural businesses, the whole of each of the affected farms have been considered, which is a greater area than the Site.

Desk-based Research and Data Sources

14.3.4. The following data sources have been used to inform the assessment:

- Provisional Agricultural Land Classification, 1:250,000 series, MAFF (1983) (reprinted 2010 by Natural England and digitised in 2020)[10];
- Likelihood of best and most versatile land maps, Natural England (2017) publications[11]; and
- Soil Survey of England and Wales 1:250,000 series soil maps, SSEW (1983).

Field Surveys

14.3.5. The following field surveys have been carried out:

- Detailed Agricultural Land Classification survey carried out by Amet Property Ltd (refer to Appendix 14.1 Agricultural Land Classification); and
- Interviews with all the farmers and walk-over survey of all of the holdings carried out in February 2023. The farm reports are set out in Appendix 14.2.

Assessing Significance

14.3.6. The significance criteria used below have been devised based on professional judgement and taking full account of the IEMA Guidance. The assessment process

[10] A digital version of this map is available at https://environment.data.gov.uk/DefraDataDownload/?mapService=NE/AgriculturalLandClassificationProvisionalEngland&Mode=spatial

[11] Naturalengland.org.uk/likelihood of Best and Most Versatile agricultural land/Yorkshire and the Humber

sets out the sensitivity and the magnitude in Tables 14.1 and 14.2, and then uses the matrix in Table 14.3 to determine the resulting significance of the effects. The IEMA Guidance identifies Grades 1 and 2 as of very high sensitivity, and Subgrade 3a as of high sensitivity. In development control the "Best and Most Versatile" agricultural land is Grades 1, 2 and 3a with no differentiation. Natural England in their Technical Advice Note TIN049[12] identifies that Grades 1 and 2 account for an estimated 21% of agricultural land in England, and Subgrade 3a a further 21%. The Utilised Agricultural Area[13] in 2022 was 8.9 million hectares, of which therefore approximately 1.87m ha is Grades 1 and 2, and 1.87m ha is Subgrade 3a.

Table 14.1: Receptor Sensitivity Criteria

Sensitivity	ALC/biomass production*	Sensitivity of topsoil and subsoil**	Agricultural businesses
Very high	Land of ALC Grades 1 and 2	-	-
High	Land of ALC Subgrade 3a	High clay soils where the field capacity days ('FCD')*** is >150, or medium textured soils where the FCD is >225	-
Moderate	Land of ALC Subgrade 3b	High clay soils where the FCD is <150, or medium textured soils where the FCD is <225	Full-time businesses, and farm businesses where the location of land is particularly important, such as dairy farms.
Low	Land of ALC Grades 4 and 5	Soils with a high sand fraction where the FCD is <225	Part-time farms or farms with low sensitivity to change, e.g. arable land held on short-term arrangements.
Very low	Land of ALC Grades 4 and 5 with only indirect links	-	Agricultural land that is not farmed or does not form part of a farm business.

[12] Natural England Technical Information Note TIN049 (December 2012)

[13] National Statistics: agricultural land use in England at 1 June 2022, Defra (29 September 2022)

[*] IEMA Guidance Table 2

[**] IEMA Guidance Table 4. For the full list. refer to the IEMA Guidance Table 4

[***] Field Capacity Days i.e. days when the soil is replete with water

14.3.7. The impact magnitude criteria are set out below. The IEMA Guidance is not based on a change of use, but on loss. Loss is defined in Table 3 of the IEMA Guidance as '*permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading)'*.

Table 14.2: Impact Magnitude Criteria

Magnitude of Effect	Definition	
	Effects on Agricultural Land (Soils)	**Effects on Farm Businesses (agricultural businesses)**
High	The Proposed Development would directly lead to the loss (including permanent sealing or land quality downgrading) of one or more soil functions or soil volumes over an area of over 20 hectares ('ha') of soil-related features; or potential for improvement in one or more soil functions over an area of more than 20ha.	The impact of the Proposed Development would render a full-time agricultural business non-viable.
Medium	The Proposed Development would directly lead to the loss (including permanent sealing or land quality downgrading) of one or more soil functions or soil volumes over an area of between 5ha and 20ha of soil-related features; or potential for improvement in one or more soil functions over an area of between 5ha and 20ha.	The impact of the Proposed Development would require significant changes in the day-to-day management of a full-time agricultural business, or closure of a part-time agricultural business. Loss of buildings or impacts on drainage or water supplies affecting the potential for at least 5ha of adjacent land to be farmed fully.
Low	The Proposed Development would directly lead to loss (including permanent sealing or land quality downgrading) of one or more soil functions or soil volumes over an area of less than 5ha of soil-related functions; or potential for improvement in one or more soil functions over an area of less than 5ha.	Land take would require only minor changes in the day-to-day management / structure of a full-time agricultural business or land take would have a significant effect on a part-time business. Minor effects, direct or indirect, on surrounding land beyond the boundary of the Site.

Magnitude of Effect	Definition	
	Effects on Agricultural Land (Soils)	Effects on Farm Businesses (agricultural businesses)
Very low	Only minor loss or reduction or improvement of soil functions or volumes.	Land take would require only negligible changes in the day-to-day management of a full-time agricultural business or land take would require only minor changes to a part-time farm business.
No change	No discernible loss or reduction in soil functions or volumes.	No effects on farm businesses.

14.3.8. The IEMA Guidance then determines the significance. Unlike the majority of ES assessments, as the IEMA Guidance includes a very high sensitivity category, the assessment has an extra column. Under the IEMA Guidance, 1ha of Grade 1 or 2 land lost would amount to a moderate adverse significant impact. Accordingly, it is considered appropriate that the assessment makes moderate significance impacts not "significant" in EIA terms.

Table 14.3: Significance of Effect Matrix

		Sensitivity of Receptor / Receiving Environment to Change / Effect				
		Very high	High	Moderate	Low	Very low
Magnitude of change/effect	High	Major adverse/ beneficial	Major adverse/ beneficial	Major adverse/ beneficial	Moderate adverse/ beneficial	Minor adverse/ beneficial
	Medium	Major adverse/ beneficial	Major adverse/ beneficial	Moderate adverse/ beneficial	Minor adverse/ beneficial	Negligible
	Low	Moderate adverse/ beneficial	Moderate adverse/ beneficial	Minor adverse/ beneficial	Negligible	Negligible
	Very low	Minor adverse/ beneficial	Minor adverse/ beneficial	Negligible	Negligible	Negligible
	No Change	Neutral	Neutral	Neutral	Neutral	Neutral

14.3.9. Major adverse or beneficial effects are considered likely to be significant in the context of the EIA Regulations. Moderate effects are considered likely to be material in the decision making process, but are not significant in the context of the EIA Regulations. Neutral, negligible, and minor effects are also not considered to be significant.

Consultation

14.3.10. Table 14.4 provides a summary of the consultation undertaken to date in support of the preparation of this assessment.

Table 14.4: Consultation Summary

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
PINS	EIA Scoping Opinion (14th July 2022) ID 3.10.1	PINS stated that, in the absence of information providing the quantities and type of soils to be displaced, the location of cables to be buried and the classification of this land, the ES should assess the temporary displacement of soils caused by burying cables.	The localised cable laying within the Site is addressed in section 14.5 'Likely Significant Effects' of this chapter and the Outline Soil Management Plan ('oSMP'). The primary cable route will be assessed when the route is finalised.
	EIA Scoping Opinion (14th July 2022) ID 3.10.2	Whilst PINS agrees that an individual assessment of the effects of land loss and on soils during the construction and decommissioning phases is not required, they request that the effect is considered for the entire lifespan of the Proposed Development.	The effects on ALC grade and on soils for the construction, operation and decommissioning phases are considered in sections 14.4 'Baseline Conditions' and 14.5 'Likely Significant Effects' of this chapter and Appendix 14.3 Outline Soil Management Plan.
	EIA Scoping Opinion (14th July 2022) ID 3.10.3	PINS agrees to the Applicant's proposal to scope out effects on agricultural employment, to be considered in the socio-economics section.	The effects on agricultural employment are considered in Chapter 13 Socio-economics of the PEIR. The future implications for farm businesses are considered in section 14.5 'Likely Significant Effects' of this chapter.
	EIA Scoping Opinion (14th July 2022) ID	PINS advises that field auger survey data of the main cable route should	This will be provided for the Environmental

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
	3.10.4	be provided to evidence the findings of the ALC report and to demonstrate that BMV land has been avoided where possible.	Statement to be submitted in support of the application for development consent, following confirmation of the proposed cable route. This will determine soil type and ALC grades, and a soil handling and restoration methodology will be added into the oSMP.
	EIA Scoping Opinion (14th July 2022) ID 3.10.5	PINS requires that the ES should describe the construction, operational and decommissioning activities and how infrastructure has been designed to minimise effects on BMV.	The potential effects are assessed in sections 14.5 'Likely Significant Effects' and 14.6 'Mitigation Measures of this chapter and in Appendix 14.3 Outline Soil Management Plan. The loss of, or impact on, land of BMV has been considered and quantified.
	EIA Scoping Opinion (14th July 2022) ID 3.10.6	PINS requires that, where sheep grazing is proposed as mitigation, it should be demonstrated that the land is not subject to restrictive covenants that would prevent such use and confirm how such mitigation would be secured.	Grazing is a management tool and a beneficial agricultural land use but is not required mitigation. Section 14.5 'Likely Significant Effects' of this chapter considers the practicalities of grazing.
	EIA Scoping Opinion (14th July 2022) ID 3.10.7	PINS requires that the ES should assess the regional loss of BMV, including cumulative losses.	The national and regional context is described in Chapter 4 Alternatives and Design Evolution of the PEIR. The cumulative assessment is set

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
			out in section 14.8 'Cumulative Effects' of this chapter.
Natural England 4th July 2022	Natural England's response at Annex A - Soils and ALQ	The ES should cover: • soil disturbance; • land loss and whether BMV is lost; • any temporary disturbance should also be covered; • a SMP should be provided; • how BMV has been avoided where possible should be explained; • decommissioning details should be provided.	The topics are covered in section 14.5 'Likely Significant Effects', section 14.6 'Mitigation Measures' and section 14.7 'Residual Effects' of this chapter and in Appendix 14.3 Outline Soil Management Plan. The assessment considers the temporary or permanent effects on soils and land quality, including at decommissioning, and outlines best practice in the oSMP.
North Yorkshire Council (incl SDC) 5th July 2022	Soil Management, Agricultural Land	A Soil Resource Plan and Soil Management Plan will be needed.	The soil resource is described in Section 14.5 'Likely Significant Effects' of this chapter and the ALC is at Appendix 14.1. An oSMP is provided at Appendix 14.3.
Long Drax Parish Council (undated)	Email response	On a national scale, loss of prime agricultural land and devaluing it to poor sheep pasture, mainly keeping the weeds down is a concern.	The management of the Site is addressed in Section 14.5 'Likely Significant Effects' of this chapter and in Appendix 14.3 Outline Soil Management Plan.

14.3.11. The farm business owners or operators at the Site have also been consulted. A summary of the information provided by them on each business is in Appendix 14.2. This information has been used to inform the assessments within this chapter.

Limitations and Assumptions

14.3.12. There are no significant limitations to this assessment.

14.3.13. Detailed field survey has provided the data for a detailed ALC of the Site. In setting that in context, and in considering the policy framework, reference has been made to published "predictive" ALC maps and "likelihood of BMV" agricultural land maps. Those maps were not the result of field survey and have limitations to their accuracy as a consequence, but they are used in this assessment in full recognition of these limitations. Guidance is provided in Natural England's TIN049[14].

14.4. Baseline Conditions

14.4.1. This section of the chapter describes the agricultural resources in the following order:

- Agricultural land quality;
- Soils;
- Farm businesses; and
- Local agricultural considerations.

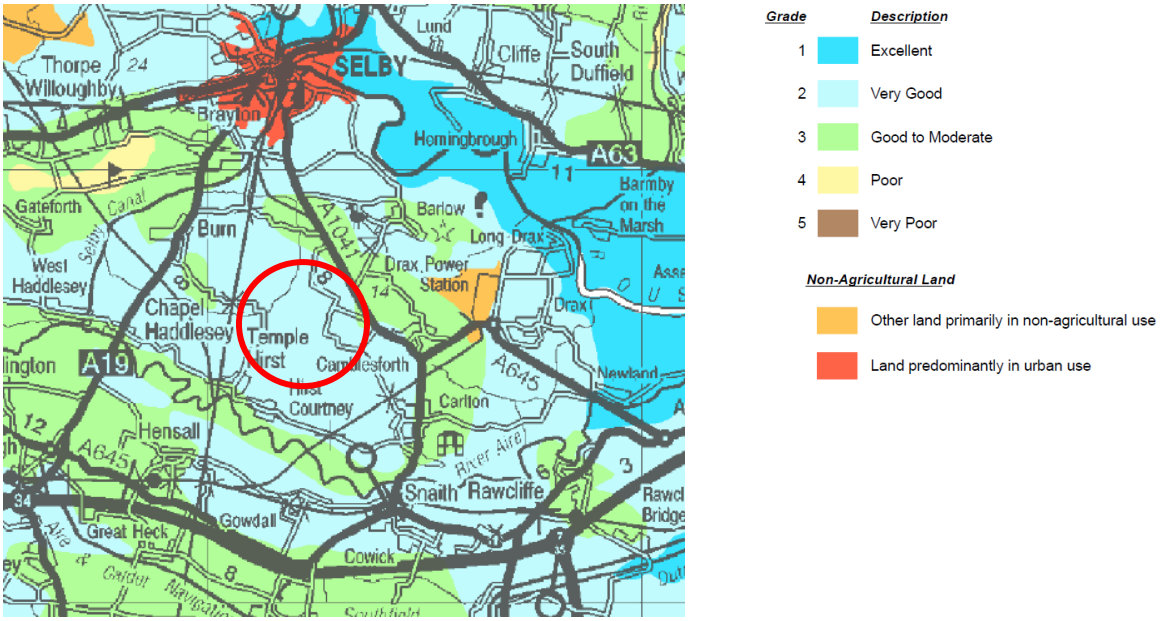
Agricultural Land Quality

14.4.2. The Site is shown on the "provisional" ALC maps from the 1970s as being of Grade 2 "very good" agricultural land quality. As can be seen on Figure 14.1 Extract from Provisional ALC Map, much of the wider area in the vicinity of the Site is similarly shown to be of Grade 2 agricultural land quality. The Site area is circled. These maps are not sufficiently accurate for use in assessment of individual fields or development sites, and should not be used other than as general guidance, as advised in Natural England's TIN 049.

[14] Available at: https://publications.naturalengland.org.uk/publication/35012 Accessed: September 2023.

Figure 14.1 Extract from Provisional ALC Map

Figure 14.1: Extract from Provisional ALC Map (centre of site circled)



Taken from Natural England's online 2010 plan.
For general guidance only.

14.4.3. In 2017, Natural England published plans showing the likelihood of the proportion of BMV agricultural land. These maps divide the agricultural land across England into three categories of proportions:

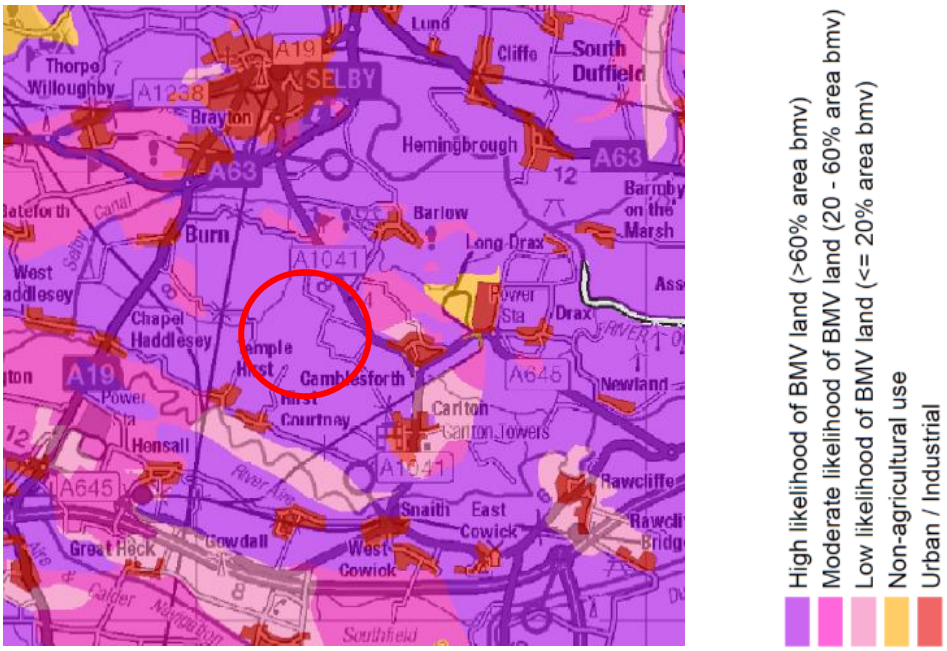
- High (>60% area of BMV agricultural land);
- Moderate (20 - 60% area of BMV agricultural land); and
- Low (<20% area of BMV agricultural land).

14.4.4. The Site is shown as being wholly of high likelihood of comprising BMV agricultural land, as is much of the wider area in the vicinity of the Site, as shown on Figure 14.2[15].

[15] The map and the guidance note are available at: https://publications.naturalengland.org.uk/category/5208993007403008 Accessed: September 2023

Figure 14.2 Extract from Likelihood of BMV Agricultural Land Quality Maps

Figure 14.2: Extract from Likelihood of BMV Agricultural Land Quality Maps (centre of the Site circled)



14.4.5. The Site has been the subject of a detailed ALC survey. This was undertaken by Amet Property Ltd in March 2022.

14.4.6. The ALC survey results are reported at Appendix 14.1.

14.4.7. The ALC of the Solar Farm Zone (which does not include the Underground Cable Corridor), is described below and shown on Figures 14.3, 14.4 and 14.5. The route of the underground cable is not yet defined. The cable will involve a trench, which are typically 1.5m in width, and will involve a temporary movement and replacement of soils which will not alter the ALC grade, and accordingly an ALC survey is not necessary for the assessment. The cable route is assessed in paragraph 14.5.27 et seq.

14.4.8. The ALC of the Solar Farm Zone is summarised in Table 14.5. This includes the non-agricultural areas.

Table 14.5: Summary of ALC within the Development Area (rounded to nearest ha)

Grade	Description	Area (ha)	Area (%)
1	Excellent	15	3.7
2	Very good	162	40.5
3a	Good	207	51.8
3b	Moderate	11	2.8
NA	Non-agricultural/not surveyed	5	1.2
Total		400	100.0

14.4.9. The ALC report (refer to Appendix 14.1) describes the soils identified. The northern part of the Site consists of loamy sand with areas of slightly lighter (sand) topsoil and areas of heavier (sandy loam) topsoil. The ALC report sets out photographs of soils identified during the survey. The following photographs complement those photos, to show the sandy soils of the northern part of the Site. Reference is made to the fields shown on Figure 3.1 Field Boundaries Plan of the PEIR.

Photographs 14.1 and 14.2: Pits Showing Soil in the Northern Block

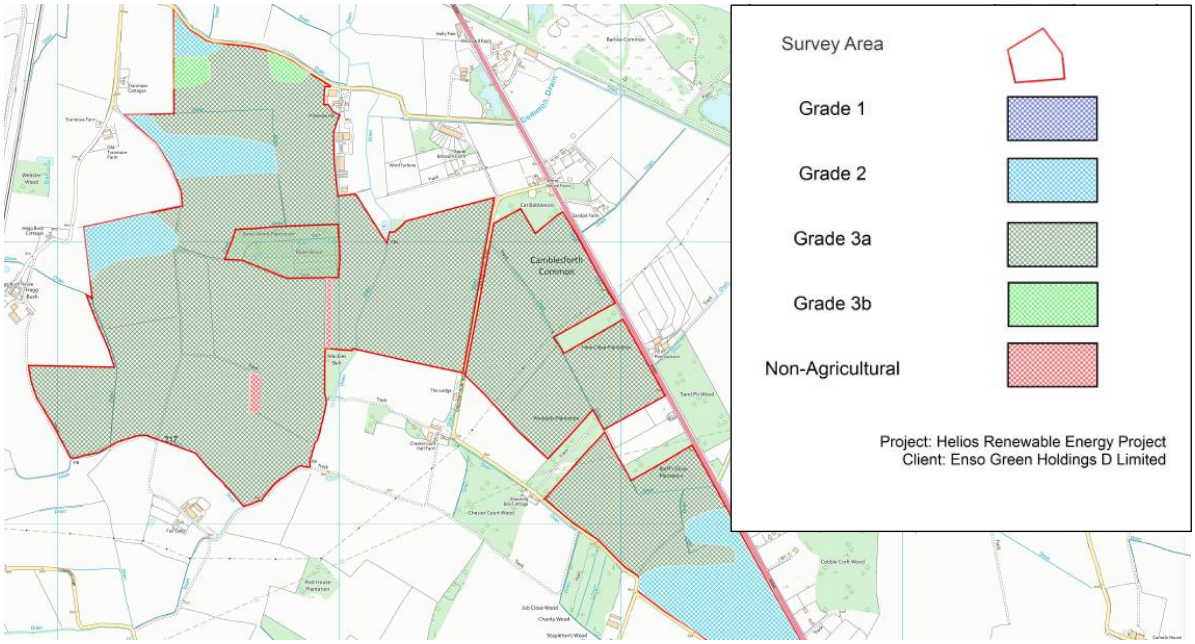
Example pit in Field 8

Example pit in Field 16

14.4.10. The land in the northern part of the Site (fields 1, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17) (see Figure 14.3) is mostly of Subgrade 3a quality as shown below on an extract from the ALC plan of the Site included in the ALC report (refer to Appendix 14.1). There are some areas of Grade 2 in parts of fields 1, 2 and 4, and patches of Subgrade 3b in field 1.

Figure 14.3 Extract from the ALC Plan

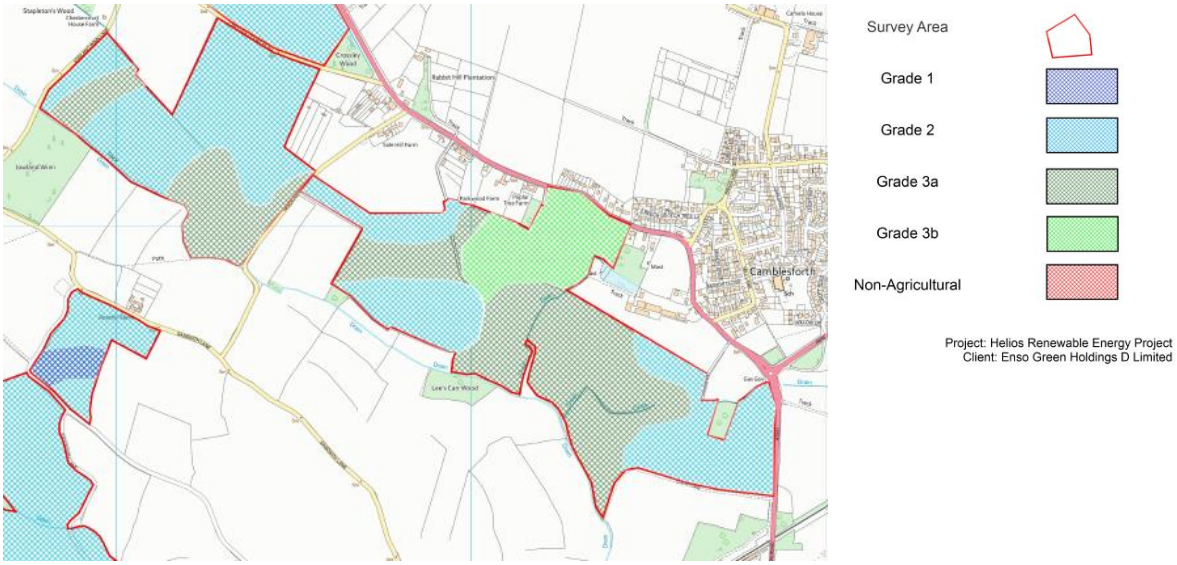
Figure 14.3: Extract from the ALC Plan



14.4.11. The eastern part of the Site shown on Figure 14.4 is similarly sandy loam soils but in a more variable pattern. Near Stockshill Farm is an area of sandy clay loam topsoil and clay subsoils. The grading of that part of the Site is shown on Figure 14.4. Grade 2 agricultural land, mixed with Subgrade 3a, has been identified in fields 19, 20, 21, 22, 25 and 29, with Subgrade 3a in field 24 and Subgrade 3b in field 23.

Figure 14.4 Extract from the ALC Plan

Figure 14.4: Extract from the ALC Plan



14.4.12. The southern part of the Site consists of soils of sandy clay loam or sandy loamy soils, occasionally loamy sand. The subsoils are more variable than elsewhere within the Site, but are mainly of medium to well-structured clay loam and sandy loam with loamy sand and sand at deeper horizons. The ALC identifies patches of Grade 1 mixed with Grade 2 in fields 34, 35, 36, 38 and 44. The other fields (37, 39, 40, 41, 42, 43) are identified as Grade 2.

14.4.13. A soil profile and soil pit from this general area are shown in Photographs 14.3 and 14.4 below.

Photographs 14.3 and 14.4: Soil Profile and Pit in the Southern Area

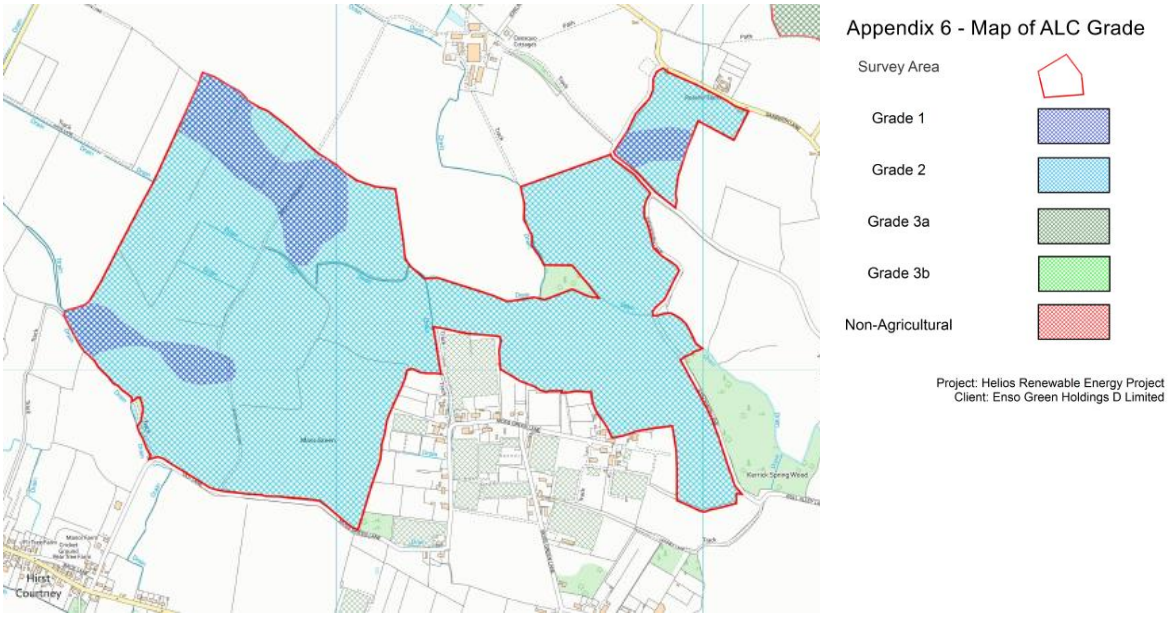
Soils from Field 34

Soils from Field 40

14.4.14. As shown in Figure 14.5 below these soils give rise to an ALC grading of Grades 1 and 2.

Figure 14.5 Extract from the ALC Plan

Figure 14.5: Extract from the ALC Plan



Soils

14.4.15. The soils have been described above and are almost all sandy soils with sandy subsoils. The pits show the sandy nature of the soils.

14.4.16. Soils with a high sand fraction are identified as of low sensitivity to damage from being handled in Table 14.1 above. These soils are well-drained and consequently capable of being driven across in vehicles ('trafficked') for a large part of the year. For example, the following sprayer was operating in February 2023 and the limited impact on the soils is clear in photograph 14.7. These soils are already trafficked numerous times per year as part of normal agricultural husbandry. Conditions vary across the year and season to season. The oSMP sets out parameters and conditions when soils are suitable for being trafficked. There are times in winter, and very occasionally short periods at other times of the year, when the land is not suitable for being trafficked, as set out in the oSMP.

Photographs 14.5 - 14.7: Sprayer and Its Impact on Soils

Photograph 14.5: Sprayer Operating in the Site Area

Photograph 14.6: Sprayer in Operation (February 2023)

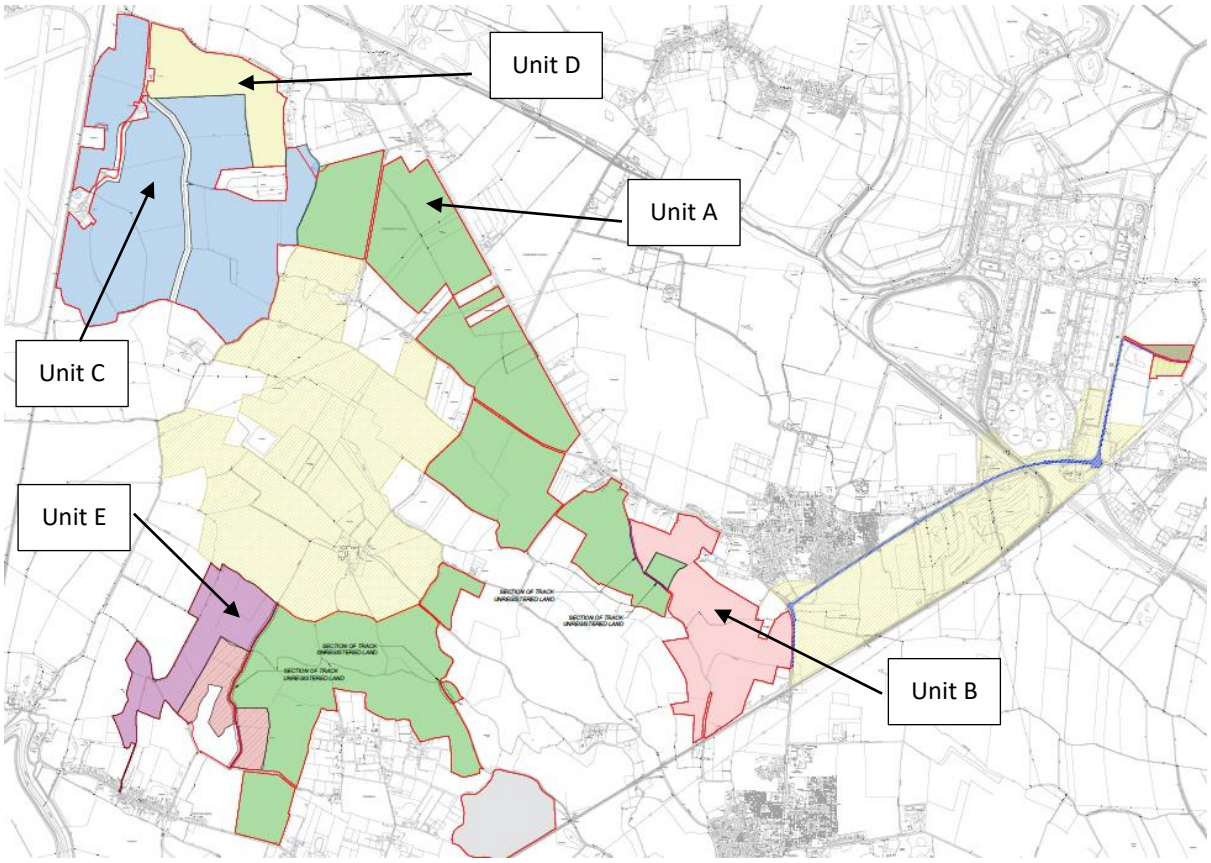
Photograph 14.7: Limited Indentation Following Passage of Sprayer

Farm Businesses

14.4.17. There are five farm businesses that farm land within the Site (excluding the Underground Cable Corridor areas shown on Figure 3.2 Parameter Plan of the PEIR). Their distribution is shown on plans in the farm reports set out in Appendix 14.2. The map is reproduced below in Figure 14.6.

Figure 14.6 Map of Farm Land Within the Site

Figure 14.6: Map of Farm Land Within the Site



14.4.18. ‘Unit A’ is part of an arable farm operated from Quosquo Farm. The total holding extends to 570ha, with the base and all the buildings at the central farmyard. 226ha (40%) is within the boundary of the Site, shown on Figure 14.6 above.

14.4.19. Quosquo Farm operates an arable rotation, with the crops and rotations varying across the holding. On the sandier land to the north (within and north of the Site) potatoes and carrots are included in the rotation (carrots usually on a seven-year spacing, potatoes on a 10-year spacing). Root cropping is a specialist enterprise and a small number of fields are let out annually to tenant farmers for that purpose.

14.4.20. A grassland ley has been introduced into the rotation in 2022/2023, but the main rotation is cereals with a ‘break’ crop (the typical rotation over four years is winter wheat, winter barley, winter oats, oilseed rape). The farming practices minimise cultivations as much as possible and typically the farm uses a disc and 8" tine with a crumbler before drilling. Subsoiling is carried out as needed.

14.4.21. Organic matter levels in the soils are generally low (<2.5%).

14.4.22. ‘Unit B’ is part of Stocks Hill Farm. Stocks Hill Farm is a mixed tenure holding of 1,012ha. The land within the Site was added to the farm in 2022 and extends to 33ha as shown on Figure 14.6 above and comprises 3% of the holding.

14.4.23. The farm operates an arable enterprise with a rotation of wheat, barley, oats and oilseed rape. The farm also has 100ha of grazing land for a beef breeding herd and a sheep breeding flock, but not within the Site. The land affected is currently arable but would have grassland in the rotation at times.

14.4.24. ‘Unit C’ is part of Fair Oaks Farm. Fair Oaks Farm holding extends to 271ha, of which approximately 251ha is farmed. The principal block extends to about 142ha around the farmyard, with the rest of the land to the west of the railway line which runs to the west of the Site. 92ha (34% of the farm) falls within the Site and is shown on Figure 14.6 above.

14.4.25. Fair Oaks Farm is mostly in an arable use, with the normal rotation consisting of spring and winter barley, winter wheat and oilseed rape grown by the farmers, and periodic root crops (comprising sugar beet, carrots and parsnips) grown by other farmers periodically within the Site. Occasionally small fields within the farm are rented out to others for growing maize or potatoes.

14.4.26. There is irrigation available for part of the farm. Typically, only carrots are irrigated, when grown, and the other periodic crops, as well as cereals and 'break' crops are not irrigated.

14.4.27. Unit D on Figure 14.6 is part of Primrose Hill Farm, which extends to 730ha of owned or contract farmed arable land. The area within the Site extends to 21ha (3% of the farm) and is shown as Unit D on Figure 14.6 above.

14.4.28. The cropping on the land within 'Unit D' includes cereals and 'break' crops, plus sugar beet, carrots and potatoes on rotation. The produce is used for a mix of animal feed, industrial use and human consumption.

14.4.29. 'Unit E' is a block of 34ha and is farmed on a share-farming agreement with other farmers. 20 ha (58% of the block) is within the Site, shown on Figure 14.6 above. The land is usually in a cereal and break crop (eg beans, oilseed rape) rotation.

Future Baseline Conditions

14.4.30. It is anticipated that there would be no change to the baseline conditions outlined above for the future baseline year of 2026. There may be variations in cropping including agri-environmental land management, but continued agricultural use of the land is expected.

14.5. Likely Significant Effects

Measures to be adopted by the Project

14.5.1. In accordance with best practice, soils will be handled so far as possible when the soils are dry and in a suitable state for being trafficked or handled. An oSMP which sets out the appropriate measures to be implemented is provided at Appendix 14.3. The detailed SMP will be secured by DCO requirement.

Construction Phase

14.5.2. The Proposed Development's construction phase effects have been considered in terms of the solar PV arrays, tracks, fixed equipment, fencing, cabling, substation and landscaping.

14.5.3. The solar PV element of the Proposed Development is installed in the following key stages:

1 Marking out and laying-out of posts;

2 Piling-in of posts;

3 Bolting together of frames;

4 Bolting-on of panels; and

5 Cabling and trenching.

14.5.4. The first process involves marking out the grid on the ground by persons on foot, then laying out the framework posts. This stage is non-instrusive. It involves machinery carrying the framework posts, and should ideally take place when soils are suitably dry. A tractor and trailer will be used to transport the framework posts to the fields, then each framework post is lifted off by hand and laid out ready for insertion.

14.5.5. Construction workers then knock the framework posts into the ground. This process is anticipated to have very little impact on the soil because the framework posts are inserted mechanically into the soil with no removal of soil. The soil is simply pushed aside by the post. An example of this construction activity from another project is shown in photograph 14.8 below, which shows the installation of framework posts into a clay soil. A person holds the post up at the right position, and the machine uses a hammer action to drive the post down to the correct depth. There is no digging or other disturbance to the soil, as can be seen in the following example.

Photograph 14.8: Recently Installed Framework Posts (Tiln Farm, Retford, January 2023)

14.5.6. The machinery involved in the installation process is generally small, and typically smaller than most farm machinery that is currently used on the Site. This can be seen in the following photograph.

Photograph 14.9: Framework Posts being Installed (Bentham Farm, July 2015)

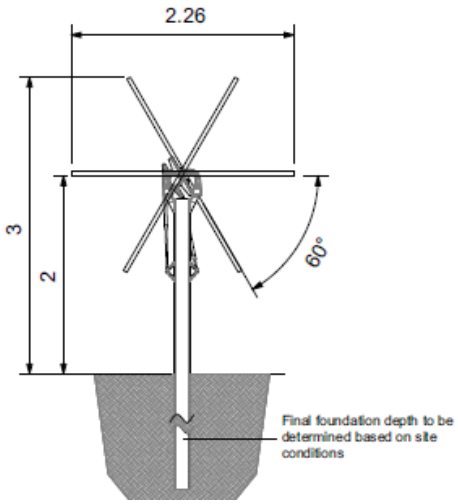
14.5.7. The design of the panels varies between sites, but the limited impact that installing framework posts has on the underlying land and soil is illustrated below. These are different designs above ground but with similar framework posts, and therefore relevant. The purpose of the photograph is to show that the physical process of installing the framework post has resulted in little disturbance to the soils. The design above ground is not important. The photograph shows the framework posts after installation and the minimal effects of construction traffic are evident by the lack of damage to the grassland or soil surface.

Photograph 14.10: Framework Posts Installed (taken at Bentham Farm, July 2015)

14.5.8. The Proposed Development will implement a single framework posts unit, as shown in Figure 14.7 below.

Figure 14.7 Solar PV Panel Design

Figure 14.7: Solar PV Panel Design



14.5.9. The next stage is to bolt together the panels. The framework and panels are delivered, typically with a tractor and trailer. They are lifted off by hand or mechanically and bolted to the framework. The minimal damage caused by the construction process, carried out in dry conditions, of bolting-on the solar PV panels is evident in photograph 14.11 below of a development similar in nature to the Proposed Development, after the solar PV panels have been added to the mounting frames. It can be seen that the soil and grassland have been very little affected. The amount of impact on the soil and any vegetation cover will depend upon soil conditions at the time of delivery and assembly.

Photograph 14.11: After Solar PV Panels Bolted-on (Bentham Farm, August 2015)

14.5.10. For the Proposed Development, it will be necessary to connect electrical cables between the solar PV modules and to run the cables to the on-Site Substation. This will involve trenches, dug with a machine. The trench width will depend upon the size of cable. The cables connecting the arrays generally require narrow trenches, as illustrated below. In all cases the works involve removing the topsoil and placing it to one side of the trench. The subsoil is then removed and placed on the other side of the trench. This looks disruptive but the disturbance of the soil is limited to the width of the trench. Once the cable has been inserted the subsoil is then replaced, with the topsoil put back on the top.

Photographs 14.12 and 14:13: Cabling Channels during Cable Installation

Photograph 14.12

Photograph 14.13

14.5.11. The installation of cables for the Proposed Development involves digging whereby the soil structure could potentially be affected. The trenches will be narrow (typically up to 1.5m in width and 1.2m in depth), but soil will be dug up to install the cable. In England, it has been standard practice to bury services (such as for water, oil, gas and telecommunications) for many years, and many farms have fields with buried field drainage inserted in a similar manner.

14.5.12. There is a clear subsoil and topsoil distinction, so the topsoil would be placed on one side of the trench, and the subsoil on the other. Subsequently, once the cable has been laid, the subsoil will be added back first, followed by the topsoil, to reinstate the soil structure to its original order and state. This will be secured through the SMP.

14.5.13. The clear distinction in soil colour is shown in the photograph 14.14 below.

Photograph 14.14: Example Topsoil and Subsoil Colours (Photograph taken of soil examination in Field 34 of the Site)

14.5.14. This approach is used to ensure that soils are restored and settle within days, and return to grass growth rapidly, or are suitable for being sown. This is illustrated in Photograph 14.15, which was taken at a development site similar to the Site 14 days after the trench was first dug, for a development similar in nature to the Proposed Development.

Photograph 14.15: The Location of Photo 14.15 Two Weeks Later

Soils

14.5.15. The installation of the solar PV modules will result in very low magnitude effects on

soils. The soils are not disturbed by the installation of the posts, and the installation of cables has a temporary, short-term disturbance but no long-term effect. None of the soil resource is lost. The soils are of moderate or low sensitivity (Table 14.1), and the effect is therefore of negligible significance (**not significant**).

Land Quality

14.5.16. The land quality, measured by the system of ALC, is not affected. The installation of the solar PV arrays does not result in any sealing of land, in any irreversible loss of soil functions, or any downgrading of the land quality. Therefore, there is no loss of land. The effect is therefore of negligible significance (**not significant**).

Fixed Equipment

14.5.17. The tracks will mostly be 3.5m wide (although the maximum parameter is up to 6m), constructed of permeable aggregate over a geotextile base. The soil removed when creating the track will be stored in a shallow bund to one side of the track, so that it is available for replacement at the decommissioning phase. The stored soil will be managed as set out in the oSMP (Appendix 14.3).

14.5.18. As shown in Figure 3.5 Inverter Stations, the fixed stations will measure up to 12.2m in length and up to by 2.4m in width, and will have a small area of hardstanding around them.

14.5.19. The on-Site Substation and battery energy storage compound ('BESS') compound will occupy an area of approximately 3.4ha, including land between the substation and the hedge. This will be located on land of mostly Grade 2 agricultural land quality, as shown in Figure 14.8, with some Subgrade 3a.

Figure 14.8 ALC of Substation Area

Figure 14.8 ALC of Substation Area (area marked approximately)

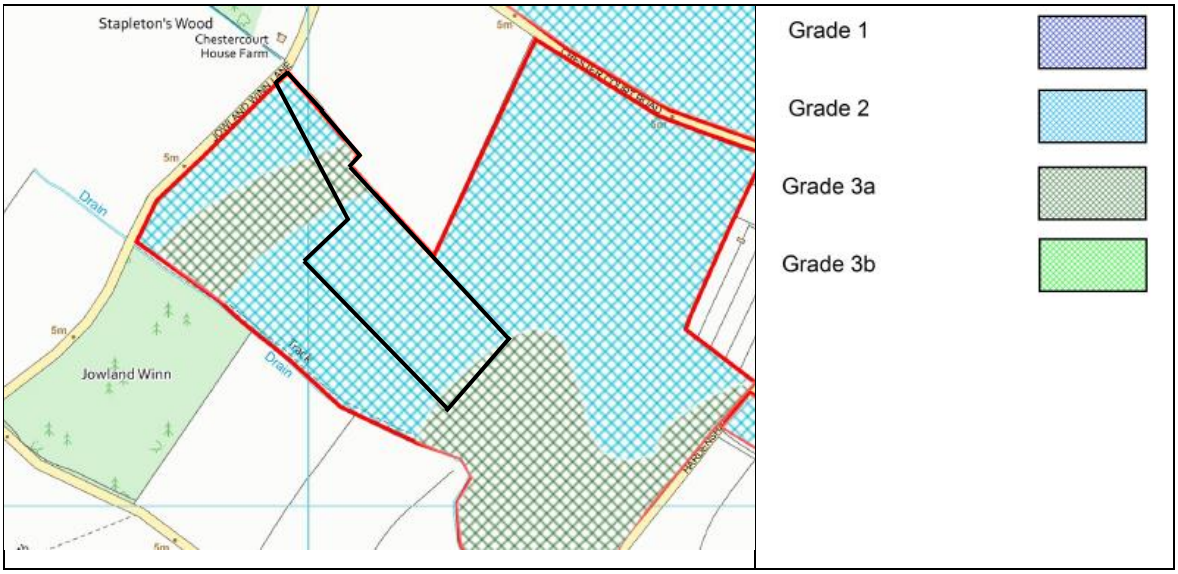


Table 14.6: Estimate of Land Affected By Fixed Equipment

Component	No/length	Area per unit	Area (ha)
Tracks (approx.)	10,800m	3.5 sqm/m	3.8
Field stations	29	60	0.2
On-Site Substation and BESS compound	1	3.4	3.4
Total	-	-	7.4

14.5.20. By ALC grade, the areas of fixed equipment are divided approximately as follows.

Table 14.7: Land Loss by Grade

	Areas in ha by ALC Grade				
Component	Grade 1	Grade 2	Subgrade 3a	Subgrade 3b	Total
Tracks	0.1	1.8	1.8	0.1	3.8
Field stations	0	0.1	0.1	<0.1	0.2
On-Site substation and energy compound	0	2.9	0.5	0	3.4
Totals	0.1	4.8	2.4	0.1	7.4

14.5.21. These areas are all capable of being restored at the decommissioning phase of the Proposed Development. The works require the removal of topsoil, its storage in suitable conditions, and its replacement following the removal of the fixed equipment. None of the fixed equipment requires deep foundations, and mostly only topsoil requires to be stripped off and stored. There is extensive advice available, for example, in the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra (2009)). The reinstatement to comparable soil properties and land grade is a proven technique which would be undertaken in accordance with a plan secured through the DCO.

14.5.22. The oSMP (Appendix 14.3) sets out the principles, but the appropriate controls will be provided through an SMP delivered through the DCO process. With the exception of the Substation area, the other works involve small areas and soil will be stored close to the area from where it was moved, so that the same soil can be returned. There is an effect for the duration of the operational phase, because these areas will not be in agricultural use and topsoil will have been removed, but no long-term loss. The effect after decommissioning will be negligible. The works do not, therefore,

involve the *'permanent, irreversible loss … (including permanent sealing or land quality downgrading)'* as defined in the IEMA Guidance.

14.5.23. Consequently, the Proposed Development will result in the disturbance of approximately 7.4ha of BMV agricultural land. This land will not be lost, in that it is all capable of restoration to a comparable grade at the decommissioning phase.

14.5.24. Over the duration of the Proposed Development (as a 'worst-case' assessment scenario), these areas are considered to be taken out of productive food use and therefore "lost" for a temporary duration to the installation of fixed equipment for the modelled 40-year operational lifespan of the Proposed Development.

14.5.25. This temporary loss of 4.9ha of Grades 1 and 2, being of very high sensitivity (Table 14.1) is a low magnitude effect (Table 14.2), leading to a moderate adverse effect (Table 14.3) for the modelled 40-year period. The subgrade 3a land is of high sensitivity (Table 14.1), and the temporary loss of 2.4ha is a low magnitude effect and also of moderate adverse sensitivity (Table 14.3). The overall impact is therefore moderate adverse for the modelled 40-year duration of the operational lifespan of the Proposed Development, which is **not significant**. All of these areas are capable of full restoration back to the current status.

Cable Connection

14.5.26. The cable connection from the Proposed Development's Solar Farm Zone to the Point of Connection will not affect agricultural land permanently. The cable will be laid into a trench, with the excavated soils subsequently reinstated. The cable will be buried below the depth of soil used by agricultural machinery, and will thereafter have no effect on agricultural land quality or activity.

14.5.27. This cable will be larger and the trench required could typically be up to 1.2m in depth and 1.5m in width. The handling of soils during the installation of the cable is set out in the oSMP (refer to Appendix 14.3). The installation methodology will involve stripping off the topsoil and setting that to one side. The subsoils will then be stripped and placed in a separate bund to the topsoils. Once the cable has been laid, the subsoil will be replaced. These are sandy soils that will settle readily, so it will not normally be necessary to press and, wherever possible, the soil would be allowed to settle naturally. The topsoil will then be replaced and levelled across the width of the trench. Guidance will follow the advice in the Defra Construction Code of Practice

for the Sustainable Use of Soils on Construction Sites (2009).

14.5.28. Once installation is complete, the area can be lightly cultivated with normal agricultural equipment, and returned to use for agriculture.

14.5.29. Overall, therefore, the installation of the connecting cable will result in negligible effects (**not significant**) on soils and agricultural land quality.

Other Local Agricultural Considerations

14.5.30. The effects on the occupying farm businesses will commence and change during the construction phase. The effects on farm size and structure, and long-term operation, are described under the operational phase below, being the effects once the Proposed Development is constructed.

14.5.31. Construction activity will be carefully controlled so that the use of the local highway network is not significantly affected, so travel between farmyards and agricultural land in the area will continue unhindered, as described in the Chapter 10 Transport and Access of the PEIR. There are no internal tracks within the area of the Proposed Development that serve other farmland, so there will be no effects of construction on other farm businesses.

Summary of Construction Phase Effects

14.5.32. In respect of direct effects during construction, it is concluded as follows:

- the effect on soils from the installation of the solar PV panels is negligible. The installation process will not irreversibly damage soils, and any adverse effects will be short-term and capable of easy restoration. The effect of construction on soils is negligible (not significant);
- the installation of solar PV panels will not result in any sealing or irreversible downgrading of agricultural land quality. Whilst there is high quality land within the Site, the land will not be lost, and the ALC grade will not be affected. Therefore, there will be no loss of ALC grade land. The effect is therefore negligible (not significant);
- the approximate area of agricultural land affected by the installation of fixed equipment amounts to 7.4ha of Grades 1, 2 and 3a. Grades 1 and 2 are of very high sensitivity, and 4.9ha is affected. The effect is a low magnitude effect (<5 ha, which is the threshold) on a resource of very high sensitivity (Grades 1 and

2), which is a moderate adverse (not significant) effect, were the land to be "lost" or "sealed over", as per Table 14.3. This is a temporary effect, capable of being fully restored to the current status at decommissioning;

- the soils are of moderate or low sensitivity. By careful management and by implementing the measures set out in the oSMP, there will be only a very low magnitude of effect on soils of a moderate or low sensitivity, which is a negligible adverse (not significant) effect;
- there will be a minor, short-term effect which will be a negligible effect from the installation of the underground electrical cables (not significant);
- by following good practice there will be no indirect effects on surrounding land, or farms, during construction, and that effect is therefore neutral or minor adverse (not significant).

Operational Phase

14.5.33. The assessment of the Proposed Development's operational phase effects is based on the Proposed Development as outlined in Chapter 3 Site and Development Description of the PEIR.

14.5.34. There will be no disturbance to soils during the operational phase of the Proposed Development; therefore, the agricultural land quality at the Site will not be affected during this phase of the Proposed Development.

14.5.35. The operational effects considered are:

- effects during the operational phase, on agricultural land quality;
- effects on soils from long-term grassland uses and the effects from site maintenance activities;
- effects on the operation of the farm businesses and local agricultural labour needs;
- food production implications. This is generally an economic/ land use consideration; and
- the economic and other considerations of the use of BMV agricultural land, as required in the Revised (Draft) NPS EN-3.

Agricultural Land Quality

14.5.36. The agricultural land quality at the Site will not be affected during the operational phase.

14.5.37. There will be no requirement for heavy machinery to traffic soils during the operational phase. Accordingly, there will be no disturbance of soils affecting land quality. The combination of increasing organic matter levels (see below) and lack of machinery activity will allow a natural enhancement of the soil. This will not, however, alter the ALC grade of land within the Site.

14.5.38. Maintenance and cleaning machinery will be transported via a van or small tractor, and generally lighter than standard machinery. If the soils are wet when access is taken, there is the potential for slight indentations to be made (such as shown in photograph 14.16 below for a development similar in nature to the Proposed Development), but such effects on soils are not significant and will not alter ALC grade.

Photograph 14.16: Example of Minor Rutting by Maintenance Machinery

14.5.39. The effect on agricultural land quality during the operational phase is therefore negligible adverse (**not significant**).

Effects on Soils

14.5.40. There will be potential for benefits to soil health and quality.

14.5.41. The land is currently fertilised with inorganic fertiliser, as well as spread with farmyard manure and liquid slurry. Grass is not generally grown in rotation currently and organic matter levels within the soil are generally low.

14.5.42. The land will be sown to grassland and managed, including by being grazed with

sheep, for the duration of the operational phase. This is expected to have a positive benefit for the soils.

14.5.43. Information about soils, and some of the expected benefits, are as follows:

(i) soils are an important natural capital resource, but our understanding of soils is hindered by a lack of data. In the Environment Agency's "Summary of the State of the Environment: Soil" report of January 2023[16] (the 'EA 2023 Report'), they note that UK soils currently store about 10 billion tonnes of carbon, equal to 80 years of annual greenhouse gas emissions;

(ii) the report notes that soil biodiversity and the many biological processes and soil functions that it supports *'are thought to be under threat'*. The statistics are:

- almost 4 million hectares of soil are at risk of compaction;
- over 2 million hectares of soil are at risk of erosion;

(iii) the state of soil biology is poorly researched, but the EA 2023 Report (ibid) identifies that intensive agriculture reduces soil biodiversity. A recent study referenced in that report identified 42% of fields may be overworked, as evidenced by an absence or rarity of earthworms. It is noted that *'tillage had a negative impact on earthworm populations, and organic matter management did not mitigate tillage impacts'* (page 11).

(iv) the UK Food Security Report 2021 notes that, whilst grain is generally the most efficient form of production in terms of calories per hectare, it has a significant environmental impact *'due to the lack of biodiversity in conventional grain fields, damage to soil through ploughing, environmental harms caused by fertilisers and pesticides, and the oil use embedded in fertilisers and field operations'*.

(v) the Environment Agency "State of the Environment: soil" report notes that bare soils, reduced hedgerows and increased field sizes mean that, in England and Wales, an estimated 2.9 million tonnes of topsoil are lost to erosion every year. Erosion regularly exceeds the rate of formation of new soils (which is at about 1 tonne per hectare per year) on many soils, with 40% of arable soils at risk, especially lighter soils on hillslopes and peats in upland areas. *'Significant decreases in erosion risk occurred when fields changed from winter cereal use*

[16] Research and analysis: Summary of the state of the environment: soils, Environment Agency (26 January 2023)

to permanent grassland', the EA reported. Management practices in arable land can make a big difference, but the constant vegetation cover of grassland reduces erosion significantly.

(vi) organic matter in soil acts like a sponge and can hold up to 20 times its weight in water. Most arable soils have lost 40 to 60% of their organic carbon[17]. The British Society of Soil Science records (Science Note: Soil Carbon, BSSS (2021)) the declining state of soil carbon (soil organic carbon and soil inorganic carbon), and notes that the greatest and most rapid soil carbon gains can be achieved through land use change, e.g. converting arable land to grassland. Sustainable soil management practices are needed for all soils.

(vii) the role of soil organic carbon in soils is complex, as described in the British Society of Soil Science Note "Soil Carbon" (2021). As described under the heading "Soil Carbon Functions" on page 4, *'a soil with a greater SOC content has a more stable structure, is less prone to runoff and erosion, has greater water infiltration and retention, increased biological activity and improved nutrient supply compared to the same soils with a smaller SOC content. Even small increases in SOC can markedly influence and improve these properties'*.

(viii) it is noted in that same report at the top of page 5 that *'significant long-term land use change (e.g. conversion of arable land to grassland or woodland) has by far the biggest impact on SOC, but is unrealistic on a large scale because of the continued need to meet food security challenges'*.

(ix) biodiversity across farms is also in a poor state. The 2019 State of Nature Report (The State of Nature 2019, The State of Nature Partnership (2019)) recorded increases and decreases in different species, but overall, a decline in the abundance and distribution of the UK's species since 1970, continuing a trend started hundreds of years earlier. The House of Commons Environmental Audit Committee (House of Commons Environmental Audit Committee: Biodiversity in the UK, bloom or bust?, First report of session 2021-22 (23rd June 2021)) recorded this in stark terms. The Summary started as follows: *'the world is witnessing a colossal decline in global biodiversity'*.

14.5.44. There is generally agreement that grassland is good for soil carbon, results in increased organic matter compared to arable land, reduces the risk of erosion, and

[17] EA, ibid, page 8.

soil biodiversity (including earthworms) will improve. There is no reason why grassland growth below solar PV panels should not be strong. The UK and this Site receives plentiful rain, which will keep soils moist, and with the Site's temperate climate, there are no reasons to anticipate differential soil temperatures affecting biological activity or biodiversity enhancement potential.

14.5.45. There will be no requirement for heavy machinery to traffic soils during the Proposed Development's operational phase. Accordingly, there will be no compacting of soils and the combination of increasing organic matter levels and lack of machinery activity will allow a natural enhancement of the soil.

14.5.46. There is therefore the potential for improvements in one or more soil functions over an area of in excess of 20ha. This would be high magnitude effect (Table 14.1), including on soils of mostly low sensitivity (Table 14.1) but including areas of sandy clay loam (medium sensitivity in IEMA Table 4). The effect will therefore be a moderate beneficial effect (Table 14.3), which is **not significant**.

Farm Business Implications

14.5.47. None of the five farm businesses will be significantly affected by the operational phase of the Proposed Development. Four of the affected farms are full-time farm businesses, and accordingly of medium sensitivity, none will be affected to the extent that a continued viable farm business cannot continue, notwithstanding the economic benefit of rental income from the solar PV panels.

14.5.48. This is assessed for each of the farm businesses as follows.

14.5.49. Individual farm reports are set out in Appendix 14.2.

14.5.50. Unit A Quosquo Farm extends to approximately 570ha, centred on the farm buildings at Quosquo Farm. The farm operates an arable rotation of cereals and arable break crops, with occasional root crops.

14.5.51. Approximately 226ha is included in the Proposed Development, representing 40% of the farm area. This will have an effect on the farming enterprises and will reduce the cropping areas. However, the cropping areas will remain considerable, at over 340ha (845 acres), which will remain full-time and economically viable.

14.5.52. There will be no severance or fragmentation. The effect is therefore a medium

magnitude impact and accordingly moderate adverse which is **not significant**.

14.5.53. Unit B Stocks Hill Farm extends to over 1,000ha (2,500 acres) with approximately 3% of the farm included within the Proposed Development. The land within the Site is arable land.

14.5.54. There will be only a minor reduction in farmed area and no severance. The effect is minor adverse (**not significant**).

14.5.55. Unit C Fair Oaks Farm is a mixed tenure holding of 271ha. The farm operates an arable rotation, which includes carrots and potatoes. There is grassland near to the farmhouse but not within the Site. There are two sets of farm buildings, also not within the Site.

14.5.56. The Proposed Development involves approximately 34% of the holding, leaving an arable (mostly) unit of about 180ha (440 acres). This will continue as an arable farm. The farmers anticipate taking on the sheep enterprise under and around the solar PV panels. Overall, the farm size will remain unchanged.

14.5.57. The effect is therefore of medium magnitude and moderate significance, which is **not significant**.

14.5.58. Unit D Primrose Hill Farm is a holding of approximately 728ha which is operated as an arable farm with carrots and sugar beet in the rotation. The farm is based outside of the Proposed Development.

14.5.59. The land within the Proposed Development amounts to approximately 3% of the farm. It will not result in any severance or fragmentation. The effect is therefore of low magnitude and of minor significance, which is **not significant**.

14.5.60. Unit E is a small block of land let to others to farm. It does not form a farm unit on its own, therefore. Approximately 58% of the parcel is included in the Proposed Development. The remaining land will continue to be let out.

14.5.61. There is therefore only a minor adverse significance effect, which is **not significant**.

14.5.62. The areas by farm unit are shown in the following table.

Table 14.8: Farm Impacts (%)

Unit	Area farmed (ha)	Proportion in the Proposed Development
A	570	40%
B	1,012	3%
C	271	34%
D	730	3%
E	34	58%

14.5.63. The areas identified in Table 14.8 as within the Proposed Development will not be lost to the farms. These areas will be grazed with sheep and their management will remain under the control of the current farmers. Whether they choose to manage the sheep themselves, or let others manage the sheep (as they do with some of the root crops currently), the farming enterprises will not be reduced in size and only the enterprise mix will change.

14.5.64. There will be benefits for the local labour market, because sheep production requires greater labour input than arable farming. The Pocketbook for Farm Management[18] estimates of labour required for cereals and lowland sheep production are compared in Table 14.9 below. This shows that sheep production requires more labour per hectare than cereals. Therefore, overall agricultural labour needs will not reduce.

Table 14.9: Labour Estimates

Crop	Hours/ha/year
Winter cereals, including hauling straw	14
Winter oilseed rape	9
Sheep – 4 hours per ewe at 9 ewes/ha	36

14.5.65. Therefore, the effects on farm businesses are minor or moderate adverse (in terms of farm structure). The farms will benefit from income from the energy generated by the solar PV panels, together with income from farming sheep. Coupled with these benefits, the overall impact from this diversification is considered to be **not significant**.

Food Production Implications

14.5.66. There is no specific Government policy for producing food from agricultural land.

14.5.67. The use of land for “agriculture”, which is defined in the Town and Country Planning

[18] John Nix Pocketbook for Farm Management 2023, The Andersons Centre (September 2022)

Act 1990 (s336), is not "development" (as defined in s55 (2) (e). Planning consent is not required to use land for agriculture, or to change between any different agricultural enterprises.

14.5.68. The definition allows a wide range of agricultural uses. Some relate to food production, others do not. There is no requirement to use land for food production, or to use it for any particular intensity of use. It follows that a landowner can do what they wish with their land within the definition of agriculture. For example, the landowner could rewild and graze it at a low intensity, or graze it with horses, or plant short-rotation coppice, or plant ancillary woodland, or fallow it. Food production is not an obligation.

14.5.69. Food production or non-food crop production is not encouraged in Government policy or incentives. The Sustainable Farming Incentive ('SFI'), the full guidance for which was updated on 21st April 2023[19], is one of three new environmental schemes post-Brexit. The SFI aims to improve water quality, biodiversity, climate change mitigation and animal health and welfare. There is no mention of food production. The SFI, the guide advises, aims to:

- encourage actions to improve soil health;
- recognise how moorland provides benefits to the public; and
- improve animal health and welfare by helping farmers with the costs of veterinary advice for livestock.

14.5.70. This land is suited to the production of arable crops and the growing of grass. An analysis of the UK's self-sufficiency in these crops is set out in Appendix 14.4.

14.5.71. The Government Food Strategy (June 2022)[20] does not seek to increase food production. The "Foreword" recognises near self-sufficiency in wheat, most meat, eggs and some vegetables, but not in soft fruit although the trend is favourable. But the strategy does not seek to alter that in the main commodities. The Strategy states: *'Overall, for the foods that we can produce in the UK, we produce around 75% of what we consume. That has been broadly stable for the past 20 years and in this food strategy we commit to keep it at broadly the same level in future.'*

14.5.72. Therefore, there is no current policy regarding food production. There is current

[19] Sustainable Farming Incentive: Full guidance, Defra (April 2023)
[20] Government Food Strategy, Defra (13 June 2022)

policy regarding the need for renewable energy to tackle climate change, increase energy security and increase biodiversity, and food production is one consideration alongside those others.

14.5.73. In respect of the crops that can be grown, the UK is self-sufficient or near self-sufficient in cereals, oilseeds, other non-vegetable arable crops, milk and sheep meat. The UK produced just over 24 million tonnes of cereals in 2022, for example[21]. There is no reason why food security should be a concern.

14.5.74. A Government Statement at the end of 2022[22] confirmed that there are no food security concerns at the present time.

14.5.75. This can be illustrated by reference to the UK Food Security Report 2021 (latest update December 2022[23]), which set out the following:

> *'However, from a purely calorific perspective, the (below average) grain yield in 2020 of 19 million tonnes would be sufficient to sustain the population. It is equivalent to 283kg per person, 0.8 kilos per day. A kilo of wheat provides 3,400 calories (and barley slightly more at 3520 calories), making 0.8 kilos of grain over 2,600 calories, compared to recommended calorie intake of 2 to 2,500 for adults. From these figures it is easy to demonstrate that, even without accounting for other domestic products like potatoes, vegetables, grass-fed meat and dairy, and fisheries, current UK grain production alone could meet domestic calorie requirements if it was consumed directly by humans in a limited choice scenario.'*

14.5.76. There is no concern from Government about food security, and no requirements or incentives to manage land for food production. The land use change from agriculture (only some of which is for food) to a mix of energy production and agriculture will not result in any significant adverse environmental or economic effects.

14.5.77. There is therefore a negligible effect on food security (**not significant**), to the extent that this is a relevant consideration.

Economic and Other Considerations

[21] https//www.gov.uk/government/statistics/cereal-and-oilseed-rape-production/cereal-and-oilseeed-production-in-the-united-kingdom-2022
[22] Food Supply and Food Security, Defra (6 December 2022)
[23] United Kingdom Food Security Report 2021, Defra (22 December 2022)

14.5.78. The Revised (Draft) NPS EN-3 and the NPPF advise that the economic and other considerations of the use of BMV land should be considered.

14.5.79. The Utilised Agricultural Area of England is 8.9 million hectares, and as noted about 3.7 million ha of BMV land is estimated to be utilised.

14.5.80. To assess the economic benefits of BMV land, one methodology is to compare the economics of BMV land to poorer quality land, assuming that such land is used for solar panels as an alternative.

14.5.81. There is no statistical data that provides yields or economic performance of BMV land compared to non-BMV land. Accordingly, only an assessment based on professional judgement is possible, assuming that BMV land falls into the "high" performance, and non-BMV land falls into the "average" performance, in agricultural budget books. On this basis, the incremental increase in food production if BMV land is used is shown below. This assumes a wheat and barley production, rather than the grassland/maize/cereals production currently grown over the farm.

Table 14.10: Crop Production Budgets

Crop	Average yield	High yield	Difference
Winter feed wheat	8.6 t/ha	10.0 t/ha	1.4 t/ha
Winter feed barley	7.3 t/ha	8.25 t/ha	0.95 t/ha
Winter oilseed rape	3.5 t/ha	4.0 t/ha	0.5 t/ha
Lowland sheep ewes	9 ewes/ha	10 ewes/ha	1 ewe/ha

Nix Pocketbook for Farm Management 53rd Edition[24]

14.5.82. Across the BMV agricultural land within the Site this would, if the area was all used for food production, have the following implications for cereal/oilseed production. This assumes 50% wheat, 25% barley, 25% oilseed rape.

Table 14.11: Difference in Production (assuming total area 383 ha and rotational cropping)

Crop	Change in yield	Area (ha)	Change (t)
Winter feed wheat	1.4 t/ha	192	269
Winter feed barley	0.95 t/ha	96	91
Winter oilseed rape	0.5 t/ha	96	48

[24] John Nix Pocketbook for Farm Management, The Andersons Centre (September 2022)

14.5.83. This table therefore identifies that, if there was a policy decision that the land should not be used for solar but that solar PV arrays should be positioned instead on poorer quality land, then using the crude theoretical measure the implications for crop production would be:

1. 269 tonnes less of wheat;
2. 91 tonnes less of barley; and
3. 48 tonnes less of oilseed rape.

14.5.84. If all 383ha was wheat, which has the biggest differential, the drop in production would be 536 tonnes.

14.5.85. The implications for food production are limited. Indeed, because the output is mostly destined for animal feed or industrial use, the increased use of land for growing sheep, the meat from which will directly go to human food, will be a benefit.

14.5.86. Were there to be a need to consider moving the solar farm to poorer quality land, then the actual quantities of agricultural crop production involved are very limited.

14.5.87. The economic considerations for the farmers involved in the Proposed Development are beneficial, in that the diversified income coupled with continued income from sheep production will enhance overall farm income.

Summary of Operational Phase Effects

14.5.88. Therefore, it can be concluded that in respect of operational effects:

1) The effects on occupying farm businesses are of medium or low magnitude, on holdings of moderate or low sensitivity, leading to overall effects of minor or moderate significance, which is **not significant**;
2) There will be no adverse effect on agricultural land quality, therefore no change which is a neutral significance effect, which is **not significant**;
3) There will be a benefit on soil health and its carbon-holding benefits, and this will be moderate beneficial, which is **not significant**; and
4) There will be decreased arable crop production, but increased sheep. The use of land will remain agricultural. These are economic considerations and the

environmental effect is neutral, which is **not significant**.

Decommissioning Phase

14.5.89. The decommissioning phase will not have any significant effects on agricultural land or soils, nor on farm businesses.

14.5.90. The cabling connecting the solar PV modules will be disconnected, the solar PV panels will be dismantled and removed and the framework unbolted. The framework posts will then be pulled out using machinery not dissimilar to that which installed the framework posts. This machinery will likely have tracks to dissipate ground pressure and will be operated in dry conditions. This will be secured through the oSMP and Outline Decommissioning Environmental Management Plan, secured via DCO requirement.

14.5.91. Deeply-buried cables will be left in situ or removed, and shallow-buried cables which might be caught by subsoilers will be removed by removing topsoil to one pile, subsoil to another, removing the cable then reinstalling the soils. Shallower cables will be dug up with the trenches dug and restored in the same order, in a manner similar to the installation process as described in the oSMP.

14.5.92. The soils across the Solar Farm Zone will then be loosened with normal agricultural machinery, and returned to the farmers for continued agricultural use.

14.5.93. Once the solar PV modules have been removed the bases for the infrastructure can be removed. This will involve removing the crushed stone bases and matting, loosening the soil to remove compaction, then returning topsoil to the areas. The topsoil will then be worked with normal agricultural machinery to create a tilth suitable for return to the landowner.

Summary of Decommissioning Phase Effects

14.5.94. Decommissioning can be timed to be carried out when soil conditions are suitable, as set out in the oSMP, and will not have any adverse agricultural effects. Thereafter, the land will be available for continued agricultural use; therefore, the decommissioning effects are neutral, which is **not significant**.

14.6. Mitigation Measures

Construction Phase

14.6.1. It has been identified that construction activities will not result in any significant adverse effects on agricultural land, soils or farm businesses. The measures included in the oSMP (Appendix 14.3) will be implemented.

14.6.2. No further mitigation is required.

Operational Phase

14.6.3. It has been identified that operational activities will not result in any significant adverse effects and there will be benefits.

14.6.4. No additional mitigation is therefore considered necessary.

Decommissioning Phase

14.6.5. It has been identified that decommissioning will not result in any significant adverse effects.

14.6.6. No additional mitigation is therefore considered necessary.

14.7. Residual Effects

Construction Phase

14.7.1. The construction phase effects remain as described in section 14.5 ‘Likely Significant Effects’ of this chapter, as follows:

- A moderate adverse impact due to loss of <5 ha of Grade 1 and 2 agricultural land from tracks and fixed infrastructure, although following restoration this impact will revert to negligible;
- Minor temporary (40-year duration) adverse effect on soils from construction activities;
- A moderate adverse effect from the need to change enterprises on the farms involved, but overall a beneficial effect on farm business; and
- Only neutral effects on surrounding farmland.

Operational Phase

14.7.2. The operational phase effects remain as described in section 14.5 'Likely Significant Effects' of this chapter, as follows:

- No adverse effects on agricultural land;
- Benefits to soils from long-term grassland use; and
- The environmental effects of changes from arable to grassland uses are neutral.

Decommissioning Phase

14.7.3. The decommissioning phase effects remain as described in in section 14.5 'Likely Significant Effects' of this chapter, as follows:

- No significant effects on agricultural land. Areas used for fixed equipment will be restored;
- No adverse effects on soils.

14.8. Cumulative Effects

Baseline Conditions

14.8.1. The available or estimated information about the baseline land quality of the various cumulative sites is set out in the table below.

Table 14.12: Baseline ALC Information

Scheme Address	Land Quality Information (ha)	Source
Schemes with Permanent ALC Effects		
Power Station: Drax Bioenergy with Carbon Capture and Storage Project NSIP (PINS Ref: EN10120)	Grade 2: 4.9ha Subgrade 3b: 7.6ha	ALC report submitted with the application
Power Station: Drax Power Station, Drax (Ref: 2022/0107/NYSCO)	Believed to be non-agricultural	Google Earth
Construction of Converter Station and Underground Cables: Land to the East of New Road, Drax (Ref: 2022/0711/EIA	Grade 2: 93.2ha Subgrade 3a: 111.4ha Subgrade 3b: 5.8ha Grade 4: 2ha Non-agricultural: 9.1ha	Environmental Statement submitted with the application

Scheme Address	Land Quality Information (ha)	Source
	Total: 221.5ha	
Part demolition and redevelopment: Eggborough Power Station, Selby Road, Eggborough (Ref: 2019/1343/EIA)	Believed to be non-agricultural	Google Earth
Employment Park: Former Kellingley Colliery, Turvers Lane, Kellingley, Knottingley (Ref: 2016/1343/OUTM)	Not known. 57ha, former colliery.	Officer's report for the application
Employment Space: Bradholme Farm, High Levels Bank, Thorne, Doncaster (Ref: 21/00500/OUTA)	Subgrade 3a: 15ha Subgrade 3b: 88ha	Planning and Sequential Statement submitted with the application
Schemes with Temporary ALC Effects		
Solar: Land South of A645, Wade House Lane, Drax (Ref: 2023/0128/EIA)	Grade 2: 13.8ha Subgrade 3a: 77.4ha Subgrade 3b: 58.2ha Other land: 7.5ha	ALC report submitted with the application
Solar: East Yorkshire Solar Farm NSIP (PINS Ref: EN010143)	Combination of Grades 1, 2, 3a and 3b (Provisional)	Acknowledgement of S46 Notification
Energy Storage Facility: Land off New Road, Drax (Ref: 2020/1357/FULM)	Subgrade 3b: 3 ha	ALC report submitted with the application
Battery Storage: Land off Hales Lane, Drax (Ref: 2021/1089/FULM)	Subgrade 3a: 0.53ha Subgrade 3b: 0.99ha	ALC report submitted with the application
Solar: Land North and South of Camela Lane, Camblesforth (Ref: 2021/0788/EIA)	Grade 1: 0.9ha Grade 2: 30.5ha Subgrade 3a: 20.7ha Subgrade 3b: 53.2ha Non-agricultural 7.43ha Total: 112.73ha	ALC report submitted with the application
Battery Storage: Land adjacent to Barlow Common Road, Barlow, Selby (Ref: 2022/0287/SCN)	Grade 3 (desk-top research)	Screening Opinion

Scheme Address	Land Quality Information (ha)	Source
Wind Turbines: Newlands Farm, Turnham Lane, Cliffe, Selby (Ref: 2021/0348/SCN)	Not known. Scoping response references loss of Grade 1.	Scoping response
Solar: Land near Osgodby Grange, South Duffield Road, Osgodby, Selby (Ref: 2021/0978/FULM)	Grade 2: 8ha Subgrade 3a: 12ha Subgrade 3b: 46ha Total: 66ha	ALC report submitted with the application

Construction Phase

14.8.2. A number of these proposals will affect agricultural land. A number will affect such land irreversibly. As not all the information is available to enable the loss to be quantified, the significance of the cumulative effect of these proposals is not possible. However, as the Proposed Development will not result in a permanent loss of agricultural land, there will be no increased cumulative impact as a result.

14.8.3. A number of these developments are of a very different nature, and propose sealing or irreversible loss of agricultural land or land quality. Table 14.12 distinguishes between those schemes that give rise to a permanent loss of agricultural land and those with only temporary effects. The Proposed Development only gives rise to temporary effects and therefore the cumulative effects assessment is undertaken on that basis, The effects therefore are no permanent loss and a temporary change from food production to renewable energy and food production.

14.8.4. Whilst the collective total of BMV land sealed or irreversibly developed by the schemes shown in Table 14.2 will exceed 20ha, and will amount to a major adverse effect, which is significant, the Proposed Development does not contribute to that effect. The cumulative effect of the Proposed Development therefore is negligible, which is **not significant**.

Operational Phase

14.8.5. There are not expected to be any significant cumulative adverse effects during operation, so the cumulative impact is neutral which is **not significant**.

Decommissioning Phase

14.8.6. The impacts of the Proposed Development will be reversed at the decommissioning phase, so that the cumulative effect is neutral which is **not significant**.

14.9. Summary

14.9.1. **Methodology**. The Soils and Agricultural Land chapter has involved a detailed Agricultural Land Classification ('ALC') across the Site, coupled with interviews with the farmers and walkover survey.

14.9.2. **Baseline Conditions**. The agricultural land quality of the Site is a mixture of land in Grades 1, 2, 3a and 3b. The majority of the Site falls within the definition of "best and most versatile" agricultural land (BMV), as defined in the NPPF (2023).

14.9.3. **Construction Effects**. The construction of a solar farm causes limited damage to agricultural land. The framework posts are pushed into the ground with minimal disturbance to the soils. Only small areas are disturbed, for tracks, inverter stations and substation. The overall area disturbed by these elements involves less than 5 ha of Grades 1 and 2, and less than 5 ha of Subgrade 3a. These areas will be fully restored at decommissioning. The effect is, overall, **not significant**.

14.9.4. **Operational Effects**. There are no adverse effects during the operational phase. There will be benefits for the soil. The overall effect, whilst beneficial, is **not significant**.

14.9.5. **Decommissioning**. The decommissioning phase will restore the Site to the current baseline position. Therefore, the effect is neutral and **not significant**.

Table 14.13: Table of Significance – Soils and Agricultural Land

Potential Effect	Nature of Effect*	Significance **	Secondary Mitigation/ Enhancement Measures	Geographical Importance ***						Residual Effects ****
				I	UK	E	R	UA	L	
Construction Phase (accounting for measures to be adopted by the project)										
Loss of BMV land	Temporary long-term	Moderate adverse	None required			X				Moderate adverse
Effects on soils	Temporary short-term	Negligible	None required						X	Negligible
Operational Phase (accounting for measures to be adopted by the project)										
Effects on farm business	Temporary long-term	Moderate or minor adverse	Diversification of income from the Proposed Development and the opportunity for sheep grazing on-Site						X	Moderate or Minor Adverse to footprint area of land farmed but overall beneficial effect to farm businesses due to diversification of income
Effects on BMV	Temporary long-term	Neutral	None required						X	Neutral
Effects on soils	Temporary long-term	Moderate beneficial	None required						X	Moderate beneficial
Effect on food production	Temporary long-term	Negligible	None required						X	Negligible
Decommissioning Phase (accounting for measures to be adopted by the project)										

Potential Effect	Nature of Effect*	Significance **	Secondary Mitigation/ Enhancement Measures	Geographical Importance ***						Residual Effects ****
				I	UK	E	R	UA	L	
Effect on soils	Temporary short-term	Neutral	None required						X	None
Cumulative Effects										
Construction Phase (accounting for measures to be adopted by the project)										
Loss of BMV	Temporary long-term	Negligible	None required			X				Negligible
Operational Phase (accounting for measures to be adopted by the project)										
Effect on soils	Temporary long-term	Neutral	None required						X	Neutral
Decommissioning Phase (accounting for measures to be adopted by the project)										
Effect on soils	Temporary short-term	Neutral	None required						X	None
Nature of Effect * Significance** Geographical Importance *** Residual Effects ****	Permanent or Temporary Short-term, Medium-term, or Long-term Major/ Moderate/ Minor/ Negligible/Neutral Beneficial/ Adverse I = International; UK = United Kingdom; E = England; R = Regional; UA = Unitary Authority; L = Local Major / Moderate / Minor / Negligible Beneficial / Adverse									