One Earth Solar Farm

Preliminary Environmental Information Report [EN010159]

Chapter 9: Land, Soils and Groundwater

May 2024

One Earth Solar Farm Ltd

Contents

9. Land, Soil and Groundwater

Summary of Preliminary Likely Significant Effects

9.1. This Chapter sets out our preliminary assessment for land, soil and groundwater, which shows that there are no likely significant environmental effects from the construction, operation (including maintenance) and decommissioning of our Project on land or groundwater anticipated based on the assessments undertaken so far. Soil and agricultural land are determined to be potentially at risk of likely significant environmental effects in areas where the highest quality soils are present. For this Project, that is land where there are areas categorised as Agricultural Land Classification grades 2 or 3a, noting that there is no land falling within grade 1 classification within our Site. The preparation for the Environmental Statement (ES) will include undertaking a further review of available baseline data for land, soil and groundwater, which will be used to undertake an assessment of potential effects and to confirm likely significant effects. It should be noted that an Agricultural Land Classification survey has been completed for our Site. The findings will be presented in our ES, to be submitted under the DCO application.

Introduction

9.2. This Chapter of the PEIR has been prepared by RSK Environment Limited and presents the preliminary likely significant environmental effects of our Project upon land, soil and groundwater. The experience of the consultants that have prepared this chapter, who are competent experts for the purpose of the EIA Regulations, is set out in **Appendix 1-1** in **Chapter 1-6**. It is informed by the environmental information we have collected to date (which is detailed in this Chapter), as well as the current description of our Project, as set out in **Chapter 4: Our Project.**

9.3. This Chapter is supported by further detailed information that is contained within:

- **Appendix 9-1**: Land, soil and groundwater specific legislation, policy and guidance
- **Appendix 9-2**: Guidance for assessment of effects
- **Appendix 9-3**: Environmental measures

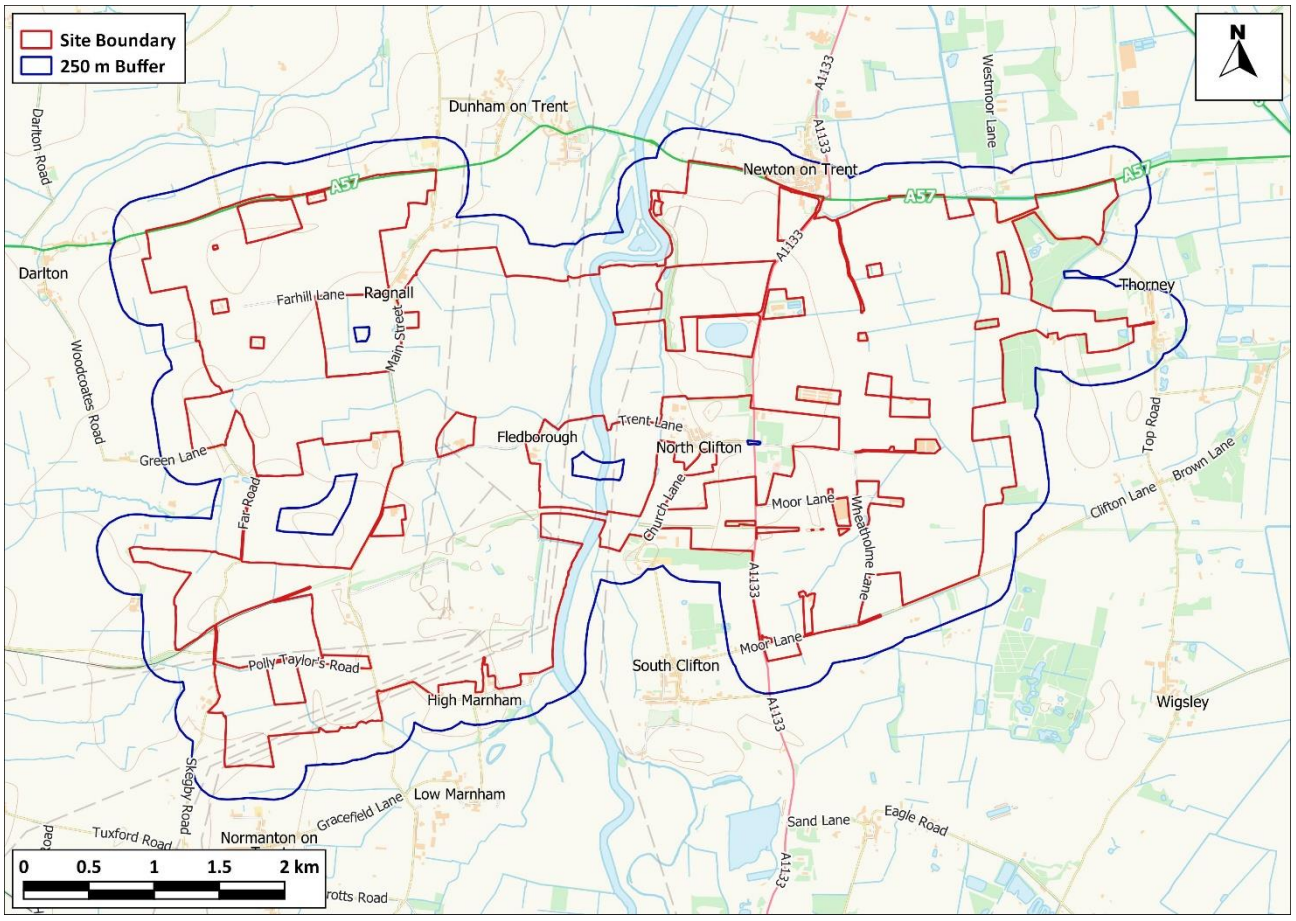
Current Land, Soil and Groundwater Conditions

Study Area

9.4. Our Site plus a 250m buffer has been considered with regard to identifying land, soil and groundwater related receptors that could be impacted by the construction, operation and decommissioning of our Project. The size of the study area is considered appropriate to identify features that may be impacted by our Project and may impact our Project. Issues that could affect sensitive receptors assessed in this section occur by direct contact (for example contamination such as a fuel spillage coming into direct contact with soil, or physical contact from construction plant affecting soil quality) or by movement of contamination through soil, subsoil or groundwater. These types of pathways or contacts are physically restricted by factors such as the geology, topography, groundwater regime and presence of surface water features. Professional judgement is used when considering whether sensitive receptors could be affected by different features or issues, and the 250m is considered sufficiently conservative to identify all relevant issues.

9.5. The study area is illustrated in **Figure 9-1** as the blue line.

Figure 9-1: Study Area



Collection of Land, Soil and Groundwater Data

9.6. The baseline conditions of the study area have been determined using the following sources:

- Geological maps (bedrock and superficial geology) (British Geological Survey (BGS) mapping accessed online[1])
- Hydrogeological and groundwater vulnerability maps (BGS database[2] and MAGIC maps [3])
- Soil survey maps ([4] and [5])
- Site-specific data and historical mapping from an environmental database report[6] (providing details of features on or close to our Site relating to water, waste, hazardous substances, geology and land use)
- Mineral resources information from Lincolnshire Minerals and Waste Local Plan[7] and Nottinghamshire Minerals Local Plan[8].

9.7. Other information sources have been consulted during the preliminary assessment work, including the BGS Onshore GeoIndex[9], Defra's MAGIC maps[10] and publicly available local authority information.

9.8. With respect to soil, a Project-specific soil sampling survey has been undertaken. Reference has also been made to the Provisional Agricultural Land Classification (ALC) map of England[11].

Land, Soil and Groundwater Baseline

Site history

[1] https://mapapps2.bgs.ac.uk/geoindex/home.html

[2] https://mapapps2.bgs.ac.uk/geoindex/home.html

[3] https://magic.defra.gov.uk/MagicMap.aspx

[4] https://magic.defra.gov.uk/MagicMap.aspx

[5] https://publications.naturalengland.org.uk/category/5954148537204736

[6] Set of four Envirocheck reports, to be provided as a technical appendix to the ES (report references 339698695_1_1, 339699668_1_1, 339700353_1_1 and 339700725_1_1, dated 19-03-2024

[7] https://www.lincolnshire.gov.uk/downloads/file/2274/adopted-site-locations-pdfa

[8] https://www.nottinghamshire.gov.uk/media/5079375/adoptedmineralslocalplancompressed.pdf

[9] https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.66027054.1050639966.1674032823-632543622.1674032823

[10] https://magic.defra.gov.uk/MagicMap.aspx

[11] https://magic.defra.gov.uk/MagicMap.aspx

9.9. The earliest historical maps for our Site (from 1884) show the land already in agricultural use, with field boundaries and drainage ditches present, along with tracks, roads, footpaths and some farm buildings. Small ponds are evident in some locations. The River Trent is present crossing through our Site area, with embankments evident in some places, suggesting flood defence systems had been constructed to protect the farmland. Some medieval features are noted on map editions (medieval villages of Whimpton and Woodcoates, both of which are outside our Site boundary). Springs are noted in some locations on-site.

9.10. By the 1900 map edition, a railway is present crossing our Site (roughly running from west to east), including a station and goods shed at Fledborough (on-site) and at Clifton-on-Trent (just outside our Site boundary). A nursery (plants) is apparent in one location on-site, but there are no other notable developments. An area of allotments is shown on-site in 1921. Old sand and gravel pits are noted close to Clifton-on-Trent railway station, which are within our Site boundary.

9.11. Mapping from the 1970s includes overhead power lines crossing some areas of our Site, associated with High Marnham Power Station (coal fired), which was located on-site. This is understood to have operated from 1959 until 2003, with demolition of the cooling towers in 2012. Pumping stations are shown in some locations within our Site boundary, associated with the drainage network.

9.12. The 1980 map edition shows the presence of a sewage treatment works adjacent to High Marnham Power Station (on-site, on the west bank of the River Trent). By this date, some poultry farming operations are apparent (located on land just outside our Site boundary).

9.13. The map from 2000 shows an oil well facility (on land that is excluded from our Site boundary), which was no longer operational by the time of our Site walkover (13 to 15 March 2024). The railway tracks are no longer present by this map edition (the line of the former railway now forms part of the Sustrans cycling route that is present within our Site boundary, and crosses Fledborough Viaduct). Some historical sand and gravel pits within our Site boundary have been infilled.

Site walkover observations

9.14. An overview of our Site was obtained during a Site walkover (March 2024). The land is predominantly used for arable farming, with a smaller fraction used for grazing (approximately 90% arable to 10% grazing). No buildings were observed within our Site boundary. Occasional ponds were observed within fields, with most surface water being present in ditches along field boundaries. In terms of potential contamination sources, some minor areas of waste storage (associated with agricultural land-use) were noted. There was no visible evidence of infilled pits or quarries. An above ground oil pipeline was noted crossing the eastern area of our Site. A former oil well facility is also present (on land that is excluded from our Site boundary, but surrounded by the northeast area of our Site). Pumping stations operate to manage the surface water in some locations. Drainage ditches were deeper in western parts of our Site. Visible discoloration of water was observed in ditches in some locations. In addition, some standing water was affected by algae. Overhead power lines are common across the area.

Animal burial sites

9.15. Historical animal burial sites are not officially recorded, and therefore it is not possible to assess whether there are any of these sites within our Site, this information has been requested from land owners and any further details will be included in the ES. Due to the long-term agricultural site usage, it is a possibility that unrecorded animal burial pits could be present.

Unexploded ordnance

9.16. A review of publicly available unexploded ordnance (UXO) risk maps indicates that the entire Site has low potential for wartime bombs to be present (Zetica, 2024).

Information from environmental database report

9.17. At this preliminary stage of our Project, a full review of environmental data has not been completed. The Preliminary Risk Assessment (PRA) report to be prepared as part of the ES will provide a detailed report of the relevant information. The following key items have been considered when undertaking the assessment to inform this PEIR:

- There are numerous discharge consents within and close to our Site, most of which relate to final effluent discharge.
- There are no active landfills recorded within our Site boundary, or within 250m.
- There is one historical landfill site located within our Site boundary. This is at High Marnham Power Station, where inert and industrial waste were imported from 1978 to 1979.
- There was also a waste management licence at High Marnham Power Station for physical treatment of waste from 2007 until 2013.
- A site located 65m from our Site boundary holds a waste management licence for a household waste transfer station, at Kettlethorpe Lagoons.
- There are three recorded historical mineral sites within our Site (Newton upon Trent clay and shale pit, Station Sand Pit and Station Gravel Pit) and others within 250m of our Site boundary (mainly sand and gravel pits, but also some gypsum and sandstone extraction sites, and clay and shale pits). These are no longer operational and based on evidence from aerial photographs and OS plans they have been backfilled.
- There are areas of potentially in-filled land on-site and within 250m, associated with historical mineral extraction pits.

Site geology

9.18. Superficial geology is present across much of our Site, although there are areas with no mapped deposits, predominantly in the western part of our Site, and more restricted areas to the east of the River Trent.

9.19. The most dominant superficial deposit is the Holme Pierrepoint Sand and Gravel member, which is present around Low Marnham, from Fledborough to Woodcoates, in bands to the west and east of the River Trent and in a more widespread distribution further east.

9.20. Alluvium is present along the route of the River Trent, and in more limited extents along more minor watercourses throughout our Site. An area of Devensian Till (mainly clay) is present in the north west of our Site, between Ragnall and Darlton. To the east of the River Trent, there are some deposits of Blown Sand.

9.21. Bedrock geology is dominated by mudstone from the Mercia Mudstone Group. This comprises mainly red mudstone with some layers of siltstones or halite-bearing units. Thin sandstone beds may be present. A small section of our Site at the far eastern extent is underlain by mudstones from the Penarth Group. These are grey to black mudstones with occasional limestone or sandstone layers.

Sites of geological importance

9.22. No designated sites of geological importance (such as local geological sites, geological conservation review (GCR) sites, geological sites of special scientific interest (SSSIs) or global geoparks) have been identified on-site or within 250m of the boundary.

Geological hazards

Potential risks from geological hazards are categorised as listed below:

- Collapsible ground stability: very low risk or no hazard
- Compressible ground stability: moderate risk or no hazard
- Ground dissolution stability: no hazard
- Landslide ground stability: low risk or very low risk
- Running sand ground stability: no hazard, very low risk or low risk
- Shrinking or swelling clay ground stability: no hazard or very low risk

Mining and mineral extraction

9.23. The entire Site is outside the Coal Authority Development High Risk Area, and is not affected by below ground or opencast coal mining.

9.24. Historical mineral extraction sites are present across our Site, mainly concentrated along the route of the River Trent. This includes extraction pits specifically to extract sand and gravel deposits, which have been infilled.

Mineral safeguarding

9.25. Our Site is located partly within Lincolnshire County Council and partly in Nottinghamshire County Council, who are the relevant Mineral Planning Authorities. The Nottinghamshire Minerals Local Plan[12] includes a mineral safeguarding and preservation area for sand and gravel running roughly along the route of the River Trent. There is one permitted site, located at Girton, for the extraction of sand and gravel. This site is located approximately 350m from our Site boundary, outside the study area. The site has permission until 2036.

[12] https://www.nottinghamshire.gov.uk/media/5079375/adoptedmineralslocalplancompressed.pdf

9.26. The Lincolnshire County Council Minerals and Waste Plan[13] does not show any mineral sites within our Site boundary or the study area.

9.27. A Minerals Assessment, to demonstrate how impacts to Mineral Safeguarding Areas have been addressed, does not form part of this preliminary assessment, but will be reported within the ES once further baseline information has been obtained and further engagement with the relevant regulatory authorities has been undertaken.

Soil

9.28. The National Soils Map, published at 1:250,000 scale, maps seven different soil associations within our Site. Land to the east of our Site mainly belongs to the Blackwood soil association. Fladbury 2 association is recorded in land adjacent to both sides of the River Trent. The south-western corner of our Site is mapped as Whimple 3 association, with land to the north-west mapped as a mix of Compton, Brockhurst 2, Worcester, Blackwood and Dunnington Heath associations. Dunnington Heath association is also mapped between Fladbury 2 and Blackwood association soils to the east of the River Trent.

- Blackwood association is typically dominated by deep permeable sandy and coarse loamy soils in glaciofluvial drift, which can be variable in stone content and frequently overlies glaciolacustrine clay or till at depth.
- Dunnington Heath association soils are typically reddish coarse and fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.
- Fladbury 2 soil are generally stoneless clayey soils variably affected by groundwater with some sandy subsoils.
- Worcester association soils are typically slowly permeable reddish clayey soils over mudstone.
- Brockhurst 2 soils are slowly permeable seasonally waterlogged reddish fine loamy over clayey and clayey soils. Heavy texture and soil wetness impose considerable limitations upon the use of these soils and cropping is mainly limited to grass and cereal growing, even with adequate underdrainage.
- Compton soils are typically stoneless mostly reddish clayey soils affected by groundwater, often at risk of flooding.
- Whimple 3 association are reddish fine loamy or fine silty over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.
- Evesham 2 soils are typically slowly permeable calcareous clayey soils.
- Peat soils have not been identified on-site.

Agricultural Land Classifications

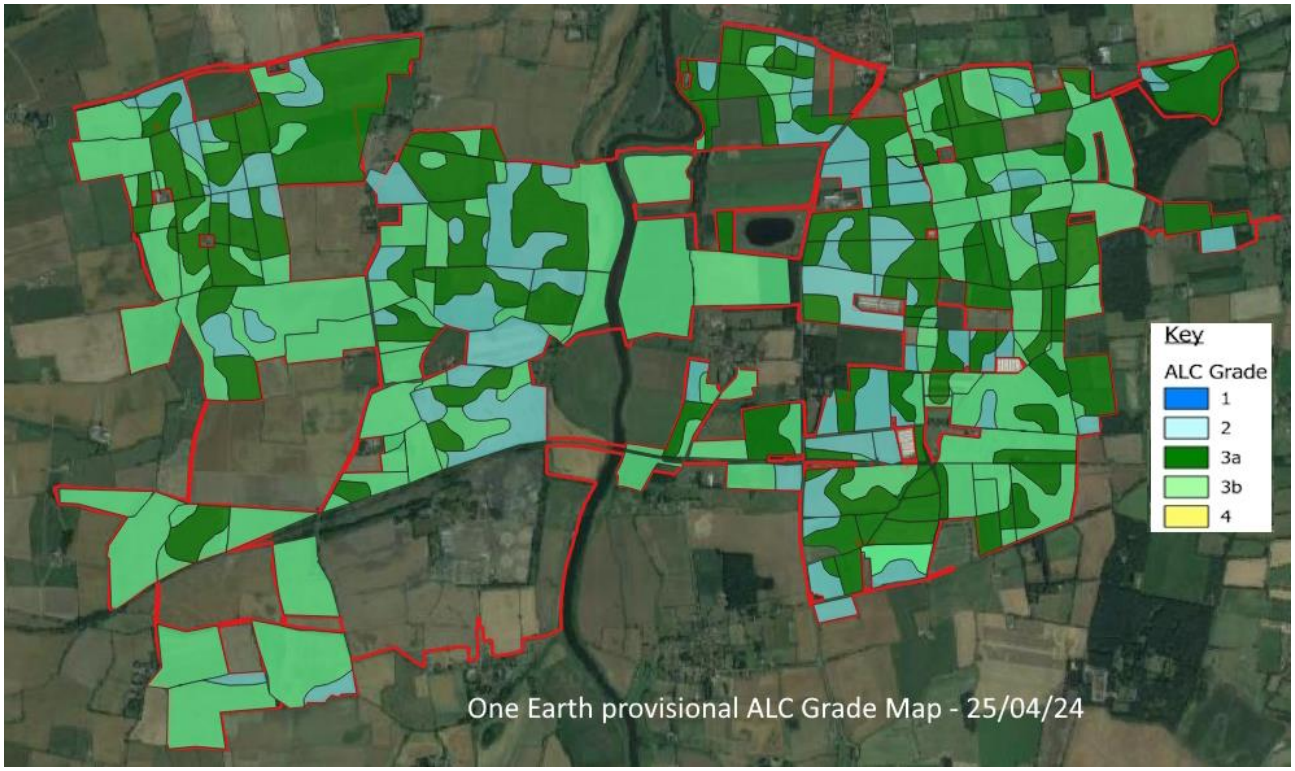
[13] https://www.lincolnshire.gov.uk/downloads/file/2274/adopted-site-locations-pdfa

9.29. The Agricultural Land Classification system (ALC) is a method of classifying the quality of land used for agricultural purposes, based on the possible limitations on agricultural use due to physical or chemical properties. The three main factors affecting ALC are climate, site and soil.

9.30. An ALC survey of our Site has been undertaken, with results awaited from a small number of locations due to access restrictions (anticipated to be available by the end of June 2024). The survey work involved using an auger to assess soil types (topsoil and subsoil) to depths up to 1.2m (approximately one sample per hectare), with some additional larger trial holes (also to 1.2m depth).The ALC survey covers the main Site area, but was not undertaken in areas that are only assigned as potential cable route options. Preliminary results for the soil within our Site boundary indicate the following ALCs, within a total land area of 1,263 Ha surveyed to date:

- Grade 1: none present
- Grade 2: 19.2% (243 Ha)
- Grade 3a: 36.0% (455 Ha)
- Grade 3b: 44.8% (565.9 Ha)
- Grade 4: none present.

Figure 9-2: Preliminary ALC Survey Results



9.31. Soil pit data are used to refine and confirm soil auger results and continuous wet conditions over winter 2023-24 have hampered progress. The soil survey field work is due to be completed in late June 2024 and confirmed land gradings will be available to inform the ES.

9.32. No detailed post-1988 agricultural land classification is publicly available for our Site. The Provisional ALC map of England, published at 1:250,000 scale, records the land as almost entirely grade 3 quality[14]. This dataset does not differentiate between 3a and 3b land, so cannot be used to determine proportions of best and most versatile agricultural land (BMV). It is also inaccurate on a field scale. As noted above, preliminary site-specific ALC results suggest that significant areas of grade 2 are found at our Site which are not mapped at the 1:250,000 scale.

Hydrogeology

9.33. The Mercia Mudstone Group bedrock units are classified as a secondary B aquifer, with the Penarth Group classified as a secondary undifferentiated aquifer. Where superficial units are present, these are categorised as secondary A aquifers. There is a small area of secondary undifferentiated aquifer where till deposits are present between Ragnall and Darlton.

9.34. There are five groundwater abstraction points located close to the River Trent, east of Ragnall. In terms of groundwater protection areas, each of these comprises a small central Zone 1 protection area, surrounded by a slightly larger Zone 1 (subsurface activity) area, and then a larger Zone 2 (subsurface activity). One of these inner zones is mainly within our Site boundary, with its associated Zone 2 partly inside and partly outside our Site boundary. Two of the others are close together, with combined Zone 1 areas that are partly within our Site boundary. The associated Zone 2 is also partially within our Site boundary. The inner zones for the other two SPZs are outside our Site boundary, with the Zone 2 just encroaching on the far north western corner of our Site.

Hydrology

9.35. The surface water environment within our Site is dominated by the presence of the River Trent, which crosses our Site area roughly from north to south (flowing northwards). Other watercourses are typically drainage features, present along field boundaries. These are as deep as 4m or 5m in places, some with embankments. Full details relating to surface water features are presented in **Chapter 8: Hydrology and Hydrogeology**.

Sensitive Land Uses

9.36. No sensitive land uses[15] for the purposes of the land, soil and groundwater assessment have been identified within our Site or within 250m of our Site boundary.

Further Data Collection

[14] Defra, 2023. *Interactive map of Great Britain*. Online resource: https://magic.defra.gov.uk/MagicMap.aspx

[15] Sensitive land uses covered by this search included: International designations – Ramsar wetland, Special Area of Conservation (SAC), Special Protection Area (SPA); National designations – Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), ancient woodland; Local designations – Local Nature Reserve, Site of Importance for Nature Conservation.

9.37. Additional site-specific data will be collected to inform our ES, which will include the preparation of a detailed preliminary risk assessment relating to land, soil and groundwater. This will assess potential risks from contamination to sensitive receptors (human health, groundwater or ecological receptors).

9.38. The remaining locations not yet accessed by the ALC survey will be completed when access has been agreed for the survey works (anticipated to be by the end of June 2024). The full Site soil classifications present across our Site will be detailed in our ES.

Future Land, Soil and Groundwater Conditions

Collection of Future Land, Soil and Groundwater Data

9.39. The baseline conditions that might occur if our Project is not progressed are assessed as part of the impact assessment process.

9.40. If our Project is not progressed, the baseline conditions with respect to land, soil and groundwater would be expected to remain broadly unchanged, therefore no further assessment against the future baseline is considered necessary.

Environmental Measures

9.41. Our Project incorporates the adoption of an outline Soil Management Plan (oSMP) (see **Appendix 9-3** for further details), an outline Construction Environmental Management Plan (oCEMP), outline Operational Environmental Management Plan (oEMP) and Decommissioning Environmental Management Plan (DEMP) to minimise emissions and sources of land, soil or groundwater pollution during the construction and decommissioning works (see **Chapter 4: Our Project** for details relating to these management plans and **Appendix 4-2** in **Chapter 1-6** for environmental measures to be included in the oCEMP). These documents will include good design and best practice measures to ensure that adverse impacts to land, soil and groundwater are avoided, reduced or mitigated. These environmental measures are considered to be embedded mitigation, therefore will be applied to any potential environmental effects prior to the technical assessment.

Potential Likely Significant Effects Scoped Out

9.42. **Table 9-1** presents the matters that we have scoped out as it is considered no likely significant effects will occur. This has been accepted by PINs as set out in the EIA Scoping Opinion.

Table 9-1: Effects Scoped Out

Matters Scoped Out	Justification
Physical damage to soil resources- Operational phase	The scoping opinion agreed to scope this out due to limited disturbance of soil, as long as details are provided in the ES relating to type and number of vehicles required for on-site maintenance, (including potential replacement of panels).

Land and groundwater contamination- Operational phase	The scoping opinion agreed to scope out this matter. It was indicated that the ES should describe any measures in place to reduce the potential for contamination during operation.

Preliminary Environmental Assessment Construction and Decommissioning Phase

Construction and Decommissioning: Land

9.43. The main potential concerns related to the construction and decommissioning activities of our Project are:

- the accidental spillage of fuels or chemicals being used during works, or
- the spreading of existing contamination due to construction or decommissioning activities.

Approach

9.44. The approach to the assessment undertaken for land and soils receptors is provided in **Appendix 9-2**.

9.45. The potential impacts from existing contamination will be assessed by the preliminary risk assessment report (to be completed and reported on as part of the ES). However, a preliminary review is presented here which uses the same assessment criteria as the ES.

Receptors and Receptor Sensitivity

9.46. **Table 1** in **Appendix 9-2** provides a guide to the criteria for determining the sensitivity of receptors associated with land. Sensitive receptors that relate to land include the following (based on guidance provided by IEMA[16]), with expected sensitivities provided for each receptor:

- Geological units (superficial and bedrock units), sensitivity 'low' for our Project based on the geological units that are present;
- Designated geological sites, sensitivity 'low', as none are present on-site or within the study area;
- Mineral extraction sites, sensitivity 'low', as no current sites are present on-site or within the study area; and
- Mineral safeguarding sites, sensitivity 'low', as there no sites within our Project boundary or study area.

[16] Institute of Environmental Management & Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (2022). Available online: IEMA publishes new land and soils guidance - IEMA

Defining Effects

9.47. The magnitude of effects is determined based on the criteria provided in **Table 3** of **Appendix 9-2**. The significance of the effect is then determined from **Table 5** of **Appendix 9-2** (based on guidance from IEMA[17]).

9.48. The effects that have been considered for construction and decommissioning phases include the following:

- Localised contamination of soils from accidental spillages of fuel or chemicals during construction works; and
- Mobilisation of existing unknown contamination within soil or groundwater.

9.49. The magnitude of impact on land receptors would be expected to be negligible, based on the criteria provided in **Table 3** of **Appendix 9-2.**

9.50. Effects on the land receptors listed above, from construction or decommissioning activities, will normally be neutral or slight, which would be reported as 'not significant' (when environmental measures have been implemented), as determined by referring to **Table 5** of **Appendix 9-2**.

Preliminary Assessment

As stated above, a oSMP, oCEMP and Decommissioning Environmental Management Plan will be adopted to minimise the environmental impacts of the construction and decommissioning works, and a set of best-practice measures will be incorporated into the specification for the works. Further information is provided in **Chapter 4: Our Project**.

9.51. These preliminary measures include the following:

- Procedures to mitigate against erosion
- Procedures to deal with unexpected contamination
- Emergency procedures to manage accidental spillages and leaks
- Independent auditing and monitoring of contractors.

9.52. Further details will be presented in the outline management plans.

9.53. If general pollution control measures are followed, there should be no likely significant effects on land as a result of the activities undertaken during the construction and decommissioning phases.

Construction and Decommissioning: Groundwater

9.54. Risks to groundwater relating to the construction and decommissioning activities include:

- the accidental spillage of fuels or chemicals
- the spreading of existing contamination

[17] Institute of Environmental Management & Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (2022). Available online: IEMA publishes new land and soils guidance - IEMA

- impacts from piling, excavations or earthworks (which could result in spreading contamination or reducing the quality of aquifers)
- damage to existing drainage systems, or
- release of contaminated run-off from Site areas.

Approach

9.55. The preliminary risk assessment will consider how likely contamination is to affect sensitive receptors. This PEIR identifies potential significant effects on groundwater based on the available information. The EIA process will then provide further assessment of any identified potential effects.

Receptors and Receptor Sensitivity

9.56. **Table 2** in **Appendix 9-2** provides a guide to the criteria for determining the sensitivity of groundwater receptors. See **Appendix 9-2** for the assessment criteria. Sensitive receptors that relate to groundwater include the following (based on guidance provided by IEMA[18]), with expected sensitivities provided for each receptor:

- The majority of our Site is underlain by secondary aquifers (in both bedrock and superficial geological units) with 'low' sensitivity because they are not connected to groundwater source protection zones (SPZs);
- SPZs near Ragnall would be classified as an area of 'medium' sensitivity for groundwater, which is partially within our Site boundary; and
- Groundwater abstraction points are present across our Site, mainly used for spray irrigation for farming. These would also be categorised as being of 'medium' sensitivity.

Defining Effects

9.57. The magnitude of effects is determined based on the criteria provided in **Table 4** of **Appendix 9-2**. The significance of the effect is then determined from **Table 5** of **Appendix 9-2** (based on guidance from IEMA[(19)]).

9.58. Based on categories in **Table 4** of **Appendix 9-2**, the magnitude of impact is considered to be likely to be low for groundwater receptors across our Site. Referring to **Table 6** of **Appendix 9-2**, the significance would therefore be either minor or negligible, which would be reported as 'not significant'.

[18] Institute of Environmental Management & Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (2022). Available online: IEMA publishes new land and soils guidance - IEMA

[19] Institute of Environmental Management & Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (2022). Available online: IEMA publishes new land and soils guidance - IEMA

Preliminary Assessment

9.59. A oSMP, oCEMP and Decommissioning Environmental Management Plan will be adopted to minimise the environmental impacts of the construction and decommissioning works, and a set of good practice measures will be incorporated into the specification for the works. These preliminary measures include the following:

- Procedures to mitigate against erosion
- Procedures to deal with unexpected contamination
- Emergency procedures to manage accidental spillages and leaks
- Independent auditing and monitoring of contractors.

9.60. Further details will be presented in the outline management plans.

9.61. If general pollution control measures are followed, there should be no likely significant effects on groundwater as a result of the activities undertaken during the construction and decommissioning phases.

Construction and Decommissioning: Soil and Agricultural Land

9.62. Likely effects during construction could include:

- Compaction and deterioration of soils and agricultural land (access tracks within our Site are likely to be most susceptible to deterioration through erosion).
- Damage to soils during handling (some soils are more susceptible to damage when handled. There will be limited handling and moving of soils during the construction of our Project and handling will be avoided where practical).

9.63. Where possible the design layout has minimised the use of BMV land. Preliminary surveys have shown that there are no ALC grade 1 areas on-site.

Approach

9.64. A detailed ALC survey of our Site will be completed when access to the remaining land parcels is possible (expected to be by the end of June 2024) and will inform the assessment in the ES that will be part of the DCO application. This will provide information on the location of soil classes across our Site areas. However, a preliminary review of the sensitivity of soils has been presented in this PEIR based on the available data, using the assessment criteria that will be applied within the ES.

Receptors and Receptor Sensitivity

9.65. **Table 1** in **Appendix 9-2** provides a guide to the criteria for determining the sensitivity of soil receptors. Soils are categorised in accordance with the ALC. Soils of ALC grades 1, 2 and 3a are considered to be BMV land. These would be deemed to be ‘very high’ (grade 1 or 2) or ‘high’ (grade 3a) sensitivity. Preliminary baseline data available for our Site indicates that soils are mainly grades 2, 3a or 3b. However, these rankings may be amended as more detailed data becomes available as the ALC survey works are completed.

9.66. Based on the preliminary information:

- 19.2% of soils are classified as grade 2and would have 'very high' sensitivity
- 36.0% of soils are classified as grade 3a and would have 'high' sensitivity
- 44.8% of soils, classified as grade 3b, would have 'medium' sensitivity and
- There are no areas where the soils would be classified as being of 'low' sensitivity (grade 4 or 5, or urban soils).

Defining Effects

9.67. The magnitude of effects is determined based on the criteria provided in **Table 3** of **Appendix 9-2**. The significance of the effect is then determined from **Table 6** of **Appendix 9-2** (based on guidance from IEMA[20]).

9.68. The magnitude of impact on soils could range from moderate to negligible, based on the descriptions provided in **Table 3** of **Appendix 9-2**.

9.69. Effects on soil from construction or decommissioning activities will potentially be 'significant' where grade 2 or grade 3a land is affected ('very high' and 'high' sensitivity, with potentially moderate magnitude of impact), but are expected to be 'not significant' for grade 3b or grade 4 land ('medium' and 'low' sensitivity, with potentially minor magnitude of impact). Adherence to a robust oSMP will be of importance in minimising negative effects on soil and agricultural land quality.

Preliminary Assessment

A oSMP, oCEMP and Decommissioning Environmental Management Plan will be adopted to minimise the environmental impacts of the construction and decommissioning works, and a set of best-practice measures will be incorporated into the specification for the works. These preliminary measures include:

- Identifying those areas within our Site which may be more susceptible to damage, for example, the temporary access tracks, construction compounds and steep slopes;
- Presenting guidelines as to when soil handling should be avoided (for example when it is wet or after periods of heavy rainfall or high winds)
- Providing guidelines as to when soils are suitable for being handled or trafficked.
- Providing soil management guidelines (for example relating to topsoil stripping, construction and storage of topsoil and subsoil in stockpiles, stockpile management)
- Providing guidelines to maintain the physical properties of the soil
- Independent auditing and monitoring of the contractor.

9.70. Further details will be presented in the outline management plans.

[20] Institute of Environmental Management & Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (2022). Available online: IEMA publishes new land and soils guidance - IEMA

9.71. Based on the information available, whilst our Site contains grade 2 and grade 3a land, taking account of the management plans which will minimise negative effects on soil and agricultural land quality, there would be expected to be no likely significant effects.

Next Steps

9.72. To ensure the final list of measures included in the oSMP, oCEMP and Decommissioning Environmental Management Plan are appropriate, a more detailed risk assessment (based on the latest description for our Project) will be conducted in the form of a preliminary risk assessment, and will be presented in our ES. ALC survey works will be completed when access to remaining areas of land is possible to provide more detailed information on the soils located across our Site.

Operational Phase

Operational Phase: Land, Soil and Groundwater

9.73. The scoping opinion confirmed that land, soil and groundwater impacts could be scoped out of the EIA process for the operational phase, as long as appropriate environmental measures would be integrated into the relevant management plans. Details of the management plans and the environmental measures to be included are detailed within **Chapter 4: Our Project** and **Appendix 4-1**. Further details on the oSMP is included in **Appendix 9-3**.

9.74. Our Project will lead to temporary impacts to soil and agricultural land for the duration of the operational phase (assumed to be 60 years), in particular, the areas in which the BESS and substations will be located. The area of land underneath the Solar PV panels and within the field margins will be used for ecological mitigation and enhancements, which will include planting of grassland and wildflowers. This planting will help to reduce soil degradation and erosion during the operational phase which could lead to potential benefits to the soil quality.

Next Steps

9.75. Industry good practice measures for the protection of land, soil and groundwater will be included in the oSMP and Outline Operational Environmental Management Plan. Further information on the amount of ALC land to be used for solar infrastructure and ecological enhancement will be presented within the DCO application.

Conclusions

9.76. **Table 9-2** presents a summary of the preliminary likely significant effects, with the further information that will be collected also outlined. It also details the next steps that will be undertaken to inform our ES.

Table 9-2: Summary of Preliminary Likely Significant Effects

Matter	Result of review of preliminary environmental information	Further Information	Next Steps
Construction and decommissioning: land	No likely significant effects	With the adoption of an oSMP, oCEMP and	A preliminary risk assessment will be completed for

Matter	Result of review of preliminary environmental information	Further Information	Next Steps
		Decommissioning Environmental Management Plan and a set of best-practice measures to control pollution, no significant effects are likely.	our Site to provide a contamination assessment, which will provide a more detailed baseline for assessment as part of the EIA process. Assessment of likely significant effects will be completed as part of the EIA.
Construction and decommissioning: groundwater	No likely significant effects	With the adoption of an oSMP, oCEMP and Decommissioning Environmental Management Plan and a set of best-practice measures to control pollution, no significant effects are likely.	The preliminary risk assessment will cover potential risks to groundwater and provide more details for undertaking the assessment within the EIA. Assessment of likely significant effects will be completed as part of the EIA.
Construction and decommissioning: soil and agricultural land	No likely significant effects	An oSMP, oCEMP and Decommissioning Environmental Management Plan and a set of best-practice soil management techniques will minimise effects on soil.	A detailed ALC survey is underway, and results will be available in time to provide a more detailed baseline for assessment as part of the EIA process. Assessment of likely significant effects will be

Matter	Result of review of preliminary environmental information	Further Information	Next Steps
			completed as part of the EIA.
Operational phase: land, groundwater, soil and ALC	No likely significant effects	With the adoption of an oSMP, Operational Environmental Management Plan and a set of best-practice measures to control pollution, no significant effects are likely.	Preparation of management plans to submit as part of the DCO application.

Appendices

Appendix 9-1: Key Legislation and Policy

Appendix 9-2: Guidance for Assessment of Effects

Appendix 9-3: Environmental Measures

Appendix 9-1: Key Legislation and Policy

Review of Policy, Legislation and Relevant Guidance

Legislation, planning policy and guidance relating to land and soils, and pertinent to our Project comprises:

Legislation

Environmental Protection Act (1990)

Part 2A provides a statutory regime for the identification and remediation of 'Contaminated Land'. It introduces a statutory definition of 'contaminated land' based on significant harm or the likelihood of significant harm or the pollution or likely pollution of controlled waters (all groundwater, inland waters, and estuaries, excluding water perched above the zone of saturation). Local authorities are the primary regulators under the Part 2A regime, with a duty to identify contaminated land in their area.

Control of Pollution Act (1974)

This Act preceded the EPA 1990 and makes provisions for the control of pollution across waste, water, noise, and public health.

Environmental Permitting Regulations (2016) (as amended)

These regulation act as an overarching permitting structure for activities which may have the potential cause harm to human health and the environment. By setting out a permitting system, they aim to reduce the number of obligations for operators, whilst still retaining robust protections, best practice and legislative implementation.

National Planning Policy

Overarching National Policy Statement for Energy (EN-1) (2023)

This provides overarching government policy on energy NSIPs, how planning applications relating to energy will be assessed, and the way in which any impacts and mitigation measures will be considered. Part 5, Section 5.8 of this policy statement specifically relates to Land Use.

Paragraph 5.11.8 states that *"The ES… should identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan. The assessment should be proportionate to the scale of the preferred scheme and its likely impacts on such receptors. For developments on previously developed land, the applicant should ensure that they have considered the risk posed by land contamination and how it is proposed to address this."*

Paragraphs 5.11.12 to 5.11.15, 5.11.23 and 5.11.34 are all directly relevant to soil and agricultural land:

"5.11.12 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).

5.11.13 Applicants should also identify any effects and seek to minimise impacts on soil health and protect and improve soil quality taking into account any mitigation measures proposed.

5.11.14 Applicants are encouraged to develop and implement a Soil Management Plan which could help minimise potential land contamination. The sustainable reuse of soils needs to be carefully considered in line with good practice guidance where large quantities of soils are surplus to requirements or are affected by contamination.

5.11.15 Developments should contribute to and enhance the natural and local environment by preventing new and existing developments 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.

5.11.23 Although in the case of most energy infrastructure there may be little that can be done to mitigate the direct effects of an energy project on the existing use of the proposed site (assuming that some of that use can still be retained post project construction) applicants should nevertheless seek to minimise these effects and the effects on existing or planned uses near the site by the application of good design principles, including the layout of the project and the protection of soils during construction.

5.11.34 The Secretary of State should ensure that applicants do not site their scheme on the best and most versatile agricultural land without justification. Where schemes are to be sited on best and most versatile agricultural land the Secretary of State should take into account the economic and other benefits of that land. Where development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality."

National Policy Statement for Renewable Energy Infrastructure (EN-3) (2023)

This policy acts forms a key document that a range of stakeholders use to understand government policy on NSIPs, how planning applications relating to energy infrastructure will be assessed, and the way in which any impacts and mitigation measures will be considered. Specific extracts relating to this Project are as follows:

Paragraphs 2.10.28 to 2.10.34 state that *"Solar is a highly flexible technology and as such can be deployed on a wide variety of land types.*

While land type should not be a predominating factor in determining the suitability of the site location applicants should, where possible, utilise suitable previously developed land, brownfield land, contaminated land and industrial land. Where the proposed use of any agricultural land has been shown to be necessary, poorer quality land should be preferred to higher quality land avoiding the use of "Best and Most Versatile" agricultural land where possible. 'Best and Most Versatile agricultural land is defined as land in grades 1, 2 and 3a of the Agricultural Land Classification.

Whilst the development of ground mounted solar arrays is not prohibited on Best and Most Versatile agricultural land, or sites designated for their natural beauty, or recognised for ecological or archaeological importance, the impacts of such are expected to be considered and are discussed under paragraphs 2.10.73 – 92 and 2.10.107 – 2.10.126.

It is recognised that at this scale, it is likely that applicants' developments will use some agricultural land. Applicants should explain their choice of site, noting the preference for development to be on suitable brownfield, industrial and low and medium grade agricultural land.

Where sited on agricultural land, consideration may be given as to whether the proposal allows for continued agricultural use and/or can be co-located with other functions (for example, onshore wind generation, storage, hydrogen electrolysers) to maximise the efficiency of land use.

The Agricultural Land Classification (ALC) is the only approved system for grading agricultural quality in England and Wales and, if necessary, field surveys should be used to establish the ALC grades in accordance with the current, or any successor to it, grading criteria86 and identify the soil types to inform soil management at the construction, operation, and decommissioning phases in line with the Defra Construction Code.

Applicants are encouraged to develop and implement a Soil Resources and Management Plan which could help to use and manage soils sustainably and minimise adverse impacts on soil health and potential land contamination. This should be in line with the ambition set out in the Environmental Improvement Plan to bring at least 40% of England's agricultural soils into sustainable management by 2028 and increase this up to 60% by 2030."

Paragraph 2.10.127 states that *"The Defra Construction code of practice for the sustainable use of soils on construction sites provides guidance on ensuring that damage to soil during construction is mitigated and minimised. Mitigation measures focus on minimising damage to soil that remains in place, and minimising damage to soil being excavated and stockpiled. The measures aim to preserve soil health and soil structure to minimise soil carbon loss and maintain water infiltration and soil biodiversity. Mitigation measures for agricultural soils include use of green cover, multispecies cover crops - especially during the winter- minimising compaction and adding soil organic matter."*

Paragraph 2.10.145 states that *"The Secretary of State should take into account the economic and other benefits of the best and most versatile agricultural land. The Secretary of State should ensure that the applicant has put forward appropriate mitigation measures to minimise impacts on soils or soil resources."*

The National Planning Policy Framework, 2023

The National Planning Policy Framework (NPPF) is an overarching document which sets out government planning policy for England, and how this is expected to be applied by local authorities and developers. The NPPF provides a framework for local sustainable development via local plans.

Regarding proposals affecting the Green Belt, paragraph 153 states that *"When considering any planning application, local planning authorities should ensure that substantial weight is given to any harm to the Green Belt. 'Very special circumstances' will not exist unless the potential harm to the Green Belt by reason of inappropriateness, and any other harm resulting from the proposal, is clearly outweighed by other considerations."*

In addition, Section 15 "Conserving and enhancing the natural environment" includes the following statements:

"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" and

"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;"

Further information relevant to the Project can be found within paragraphs 153-158 and pages 45 to 46 of the NPPF.

Environmental Improvement Plan 2023

This plan forms the first review of the government's 25 Year Environment Plan, providing the plan for the delivery of the framework. The framework sets out the Government's vision for the environment in England and identifies the need to explore improvements across a wide range of disciplines, including an approach to land use that aims to account for the environment in the first instance. Proposals within the 25-year plan also address minimising waste and improving soil health. The Plan includes a series of long term targets, with associated interim targets, such as the following which relates to agricultural chemical use:

"Long term target: Reduce nitrogen, phosphorus and sediment pollution from agriculture into the water environment by 40% by 31 December 2038, compared to a 2018 baseline.

Interim target 1: Reduce nitrogen, phosphorus and sediment pollution from agriculture to the water environment by 10% by 31 January 2028

Interim target 2: Reduce nitrogen, phosphorus and sediment pollution from agriculture to the water environment by 15% in catchments containing protected sites in unfavourable condition due to nutrient pollution by 31 January 2028."

The following commitment relates to waste:

"Long term target: By 31 December 2042, the total mass of residual waste excluding major mineral wastes in a calendar year does not exceed 287 kg per capita.

Interim target 1: By 31 January 2028, the total mass of residual waste excluding major mineral wastes in the most recent full calendar year does not exceed 437 kg per capita."

Local Planning Policy

Local planning policy relevant to our Site is set out below. Local policies can be an important and relevant consideration for NSIPs as well, but in the event of any conflict, the NPS policy prevails.

Newark and Sherwood District Council (2023) Local Development Framework, Amended Allocations and Development Management Development Plan Document (AADMDPD). Submission Version, January 2024.

This amended local Development Plan Document (DPD) has been compiled to ensure that the wider development framework within Newark and Sherwood District Council sufficiently allocates land for development to meet the needs of the area, up until 2033. The document includes *"new and amended Housing and Affordable Housing Policies which replace those included in the Amended Core Strategy and new Gypsy Roma Traveller policies and allocations. The document also sets out amendments to urban boundaries and village envelopes, retail boundaries as well as sites requiring continued protection from development (open space and green infrastructure designations). It also includes a suite of Development Management policies to provide greater direction, help deliver specific allocations and assist in the day-to-day assessment of planning applications."* This DPD is currently under examination via the Secretary of State with an independent planning inspector.

Specific policies within the AADMDPD relevant to our Project include Policy DM8 "*Development in the Open Countryside*" which states that *"In accordance with the requirements of Spatial Policy 3 of the Amended Core Strategy, development away from villages or settlements, in the open countryside, will be strictly controlled and limited to the following types of development:*

Agricultural and Forestry Development Requiring Planning Permission;

New and Replacement Rural Workers Dwellings, the Extension of Existing Rural Workers Dwellings, and the Removal of Occupancy Conditions Attached to Existing Dwellings;

New and Replacement Dwellings;

Replacement of Non-Residential Buildings;

Conversion of existing buildings;

Rural Diversification;

Equestrian Uses;

Employment uses;

Community and Leisure Facilities;

Roadside Services; and

Visitor Based Tourism Development and Tourist Accommodation."

Newark and Sherwood District Council (2019), Amended Core Strategy Development Plan

The Amended Core Strategy for Newark and Sherwood District is part of the Local Development Framework for the area. This strategy outlines the overarching issues and objectives to address over a 20-year period, contextualising this into wider vision, series of objectives and core policies toward delivery.

Core Policy 9 "Sustainable Design" states the following:

"All new development should:

- *Demonstrate an effective and efficient use of land that, where appropriate, promotes the re-use of previously developed land and that optimises site potential at a level suitable to local character."*

Central Lincolnshire Local Plan (2023)

The Local Plan for the central Lincolnshire area sets out the approach to planning policy and overarching development allocations to drive growth in the area over a 20-year period. The Local Plan is contextualised into a wider vision, series of objectives and core policies toward delivery.

Policy S14 "Renewable Energy" covers the commitment to supporting a transition to renewable energy, and includes the following comments:

"Proposals for solar thermal or photovoltaics panels and associated infrastructure to be installed on existing property will be under a presumption in favour of permission unless there is clear and demonstrable significant harm arising.

- *Proposals for ground based photovoltaics and associated infrastructure, including commercial large scale proposals, will be under a presumption in favour unless:*
- *there is clear and demonstrable significant harm arising; or*
- *the proposal is (following a site specific soil assessment) to take place on Best and Most Versatile (BMV) agricultural land and does not meet the requirements of Policy S67; or*

- *the land is allocated for another purpose in this Local Plan or other statutory based document (such as a nature recovery strategy or a Local Transport Plan), and the proposal is not compatible with such other allocation.*

Proposals for ground based photovoltaics should be accompanied by evidence demonstrating how opportunities for delivering biodiversity net gain will be maximised in the scheme taking account of soil, natural features, existing habitats, and planting proposals accompanying the scheme to create new habitats linking into the nature recovery strategy.

Policy S67 "Best and Most Versatile Agricultural Land" states that:

"Proposals should protect the best and most versatile agricultural land so as to protect opportunities for food production and the continuance of the agricultural economy. With the exception of allocated sites, significant development resulting in the loss of the best and most versatile agricultural land will only be supported if:

a) The need for the proposed development has been clearly established and there is insufficient lower grade land available at that settlement (unless development of such lower grade land would be inconsistent with other sustainability considerations);

b) The benefits and/or sustainability considerations outweigh the need to protect such land, when taking into account the economic and other benefits of the best and most versatile agricultural land;

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

d) Where feasible, once any development which is supported has ceased its useful life the land will be restored to its former use (this condition will be secured by planning condition where appropriate).

Where proposals are for sites of 1 hectare or larger, which would result in the loss of best and most versatile agricultural land, an agricultural land classification report should be submitted, setting out the justification for such a loss and how criterion b has been met."

Bassetlaw District (2011) Local Development Framework, Core Strategy and Development Management Policies DPD

The Core Strategy for the Bassetlaw District sets out the overarching vision for the area up until 2026, including the policy approach to deliver this.

Policy DM10 "*Renewable and Low Carbon Energy*" is relevant to our Project and states that:

"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 need to demonstrate that they:

i. *are compatible with policies to safeguard the built and natural environment, including heritage assets and their setting, landscape character and features of recognised importance for biodiversity;*
ii. *will not lead to the loss or damage to high-grade agricultural land (Grades 1 & 2);*
iii. *are compatible with tourism and recreational facilities;*
iv. *will not result in unacceptable impacts in terms of visual appearance; noise; shadow-flicker; watercourse engineering and hydrological impacts; pollution; or traffic generation; and*
v. *will not result in an unacceptable cumulative impact in relation to the factors above.*

Large-scale renewable and low carbon energy proposals must provide full details of arrangements for decommissioning and reinstatement of the site if/when it ceases to operate.

B. District Heating and Co-location

Proposals for new development in District Heating Opportunity Areas will, where the scale of the proposal permits, be expected to demonstrate consideration of District Heating as a means of achieving carbon compliance. District Heating opportunities include those supplied by heat from waste management sites, power stations, coalmine methane facilities, or new standalone infrastructure. Applicants will be expected to engage with the Council at pre-application stage to assess the feasibility of achieving this objective.

Where District Heating Networks are established, all subsequent new development close enough to connect to such a network will be expected to do so where there are no barriers to this connection.

Proposals for heat-producing development will be expected to demonstrate consideration of the feasibility of utilising its waste heat for heat consuming development. Support will be given to proposals that will ensure the co-location of compatible heat-producing and heat-consuming development.

C. Major Development

Major development proposals will be expected to deliver specific low-carbon and renewable energy infrastructure in line with assessments of feasibility and overall viability.

D. Community Energy Schemes

Support will be given to community led energy schemes in line with the Council's Renewable and Low Carbon Energy Study (or subsequent replacement), on exception sites if necessary, where strong local support is demonstrated."

Draft Bassetlaw Local Plan (2023) 2020-2038: Main Modifications Version, August 2023

This Local Plan sets out Bassetlaw District's planning and policy framework, development strategy and site allocations to inform effective delivery of the overall vision up until 2038.

Policies set out in the Local Plan are relevant to our Project.

Policy ST1 "*Bassetlaw's Spatial Strategy*" states that:

"The spatial strategy for Bassetlaw will be delivered over the plan period 2020-2038 through:

a) managed sustainable development and growth, appropriate to the size of each settlement or location to meet the evidenced need for new homes and jobs, to regenerate the District's town centres, and to support necessary improvements to infrastructure, services and facilities by:

> *i. promoting the efficient and effective use of land and the re-use of previously developed land in sustainable locations, unless there are overriding amenity, biodiversity or heritage matters that preclude such use; and by seeking to minimise the use of the most versatile grade 1-3 agricultural land, where practicable;*
>
> *ii. emphasising the need to develop in sustainable locations in close proximity to transport hubs and key public transport nodes, and by encouraging higher density development in those locations; and*
>
> *iii. ensuring that sufficient physical, social and green/blue infrastructure is delivered to meet identified needs in a timely manner.*

b) enabling the provision of housing land for a minimum of 9,720 dwellings (540 dwellings per annum), through completed sites, sites with planning permission, new site allocations in this Local Plan, and from site allocations in made neighbourhood plans in accordance with the settlement hierarchy in Figure 8 below:

> *a) at the Main Towns:*
>
> *1i. approximately 2,322 dwellings in Worksop Outer Area;*
>
> *2. approximately 238 dwellings in the Worksop Central DPD;*
>
> *3. approximately 2,331 dwellings in Retford; and*
>
> *4. approximately 2,203 dwellings in Harworth and Bircotes.*
>
> *b) by supporting the delivery of approximately 1,412 dwellings in the Large Rural Settlements;*
>
> *c) by supporting the delivery of approximately 1,715 dwellings in the eligible Small Rural Settlements;*
>
> *…*
>
> *4. Countryside*
>
> *c) enabling windfall sites, which are expected to be a reliable source of housing supply during the plan period contributing approximately 912 homes;*
>
> *d) considering land outside of development boundaries and/or outside the built up area(s) of settlements identified in the settlement hierarchy as part of the wider countryside, where development will only be supported where consistent with other policies in the development plan or national policy;*

e) providing for 49 permanent pitches for Gypsy and Travellers by 2037-2038 of which 27 pitches will be provided by 2028-2029 to meet identified local needs;

f) contributing to the provision of approximately 193ha of developable land in the E(g), B2 and B8 Class at the General and Larger Unit Employment Sites, and to meet the needs for B8 sub-regional/regional large scale logistics use only on approximately 118ha of land at the Apleyhead Strategic Employment Site;

g) safeguarding, regenerating and enhancing the role of the District's town centres at Worksop, Retford and Harworth & Bircotes, including a small scale extension to Harworth & Bircotes town centre to secure their longevity as vibrant centres that provide for appropriate housing, business, retail, leisure and community facilities to serve each settlement, and its catchment effectively."

Policy ST51 *"Renewable Energy Generation"* states that*:*

"3. Development that generates, shares, transmits and/or stores zero carbon and/or low carbon renewable energy including community energy schemes will be supported subject to the satisfactory resolution of all relevant site specific and cumulative impacts upon:

a) location, setting and position in the wider landscape, resulting from its siting and scale;

b) natural and heritage assets and their settings;

c) air and water quality;

d) hydrology and hydrogeology;

e) the best and most versatile agricultural land;

f) existing highway capacity and highway safety;

g) noise, light, glare, smell, dust, emissions or flicker;

h) aviation and radar;

i) recreation and local amenity.

Proposals must take into account operational and approved developments, as well as any proposed intensification to operational or approved proposals.

Proposals involving one or more wind turbines will be supported where:

a) the site is located within an area defined as being suitable for wind energy in a made neighbourhood plan or development plan document; and

b) following consultation, it can be satisfactorily demonstrated that all potential adverse planning impacts identified by affected local communities have been fully addressed, including cumulative impacts identified in Part 1 above.

4. All renewable energy development will be expected to provide details of the expected power generation based upon expected yield or local self-consumption to enable effective monitoring of the district's contribution to the national zero carbon targets.

5. A decommissioning programme applied by a Condition to any planning permission granted will be required to demonstrate that the site can be returned to an acceptable state, three years after cessation of operations."

National Guidance

Natural England (1988) 'Agricultural land Classification of England and Wales: Revised criteria for grading the quality of agricultural land (ALC011)

This guidance introduced the ALC, which provides the framework for grading land according to whether physical or chemical attributes of the land in question enforces limitations on agricultural use. This classification can be utilised at different scale and therefore can be applied at local, regional as well as national level.

Natural England (2017) Likelihood of Best and Most versatile Agricultural Land

This guidance is a mapping resource across England which visually represents the quality of agricultural land across an area, expressed through ALC grades which subsequently predict the likelihood of best and most versatile agricultural land. The maps are used for strategic planning purposes at a certain scale and use soil association predictions as the primary evidence base.

Appendix 9-2: Guidance for Assessment of Effects

For this preliminary assessment, the likely significant effects on identified receptors are reported based on the information available at the time of writing. The final assessment of likely significant effects will be reported in the Environmental Statement (ES).

A Minerals Assessment, to demonstrate how impacts to Mineral Safeguarding Areas have been addressed, does not form part of this preliminary assessment, but will be reported within the ES once further baseline information has been obtained and further consultation with the appropriate regulatory authorities has been undertaken.

A Preliminary Risk Assessment (PRA) will be completed for our Site. This will provide baseline data on our Site, alongside an assessment of risks relating to human receptors, controlled waters and other sensitive receptors. This work will be undertaken in line with the technical approach presented in Land Contamination Risk Management (LCRM) (Environment Agency, 2021) and in general accordance with British Standard (BS) 10175: 2011 + A2 2017 (BSI, 2017). The PRA report will include coverage of our Site history, geology, hydrogeology, hydrology, and other issues. A Site walkover has been completed as part of the assessment. An assessment of contaminated land will be completed by means of development of a conceptual site model (CSM), which identifies sources, pathways and receptors for contamination. A pollutant linkage is considered to exist when all three components of the CSM are identified. The significance of each pollutant linkage is then assessed to identify potential risks.

The assessment methodology for land and soils that has been used to support the information provided in this PEIR is detailed below.

Receptor sensitivity for land and soil

Sensitivity criteria for land and soil, derived from the IEMA Guide A New Perspective on Land and Soil in Environmental Impact Assessment [21], are defined in **Table 1** below.

Table 1: Receptor sensitivity for land and soil

Sensitivity (in-situ soils)	Soil resource
Very High	Biomass production: ALC grades 1 & 2 or Land Capability for Agriculture (LCA) Classes 1 & 2 Ecological habitat, soil biodiversity and platform for landscape: Soils supporting protected features within a European site (e.g., Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar); Peat soils; Soils supporting a National Park, or Ancient Woodland

[21] Institute of Environmental Management & Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (2022). Available online: IEMA publishes new land and soils guidance - IEMA

Sensitivity (in-situ soils)	Soil resource
	Soil carbon: Peat soils Soils with potential for ecological/landscape restoration Soil hydrology: Very important catchment pathway for water flows and flood risk management Archaeology, Cultural heritage, Community benefits and Geodiversity: Scheduled Ancient Monuments (SAMs) and adjacent areas; World Heritage and European designated sites; Soils with known archaeological interest; Soils supporting community/recreational/educational access to land covered by National Park designation Source of materials: Important surface mineral reserves that would be sterilised (i.e., without future access)
High	Biomass production: ALC grade 3a, or LCA grade 3.1. Ecological habitat, soil biodiversity and platform for landscape: Soils supporting protected features within a UK designated site (e.g., UNESCO Geoparks, Sites of Special Scientific Interest (SSSI) or Areas of Outstanding Natural Beauty (AONB), Special Landscape Area, and Geological Conservation Review sites); Native Forest and woodland soils; Unaltered soils supporting semi-natural vegetation (including UKBAP Priority habitats) Soil carbon: Organo-mineral soils (e.g., peaty soils) Soil hydrology: Important catchment pathway for water flows and flood risk management Archaeology, Cultural heritage, Community benefits and Geodiversity: Soils with probable but as yet unproven (prior to being revealed by construction) archaeological interest; Historic parks and gardens; Regionally Important Geological and Geomorphological Sites (RIGS); Soils supporting community /recreational/educational access to RIGS and AONBs Source of materials: Surface mineral reserves that would be sterilised (i.e. without future access)
Medium	Biomass production: ALC grade 3b or LCA grade 3.2 Ecological habitat, soil biodiversity and platform for landscape: Soils supporting protected or valued features within non-statutory designated sites (e.g., Local Nature Reserves (LNR), Local Geological Sites (LGSs), Sites of Nature Conservation Importance (SNCIs), Special Landscape Areas; Non-Native Forest and woodland soils Soil carbon: Mineral soils Soil hydrology: Important minor catchment pathway for water flows and flood risk management Archaeology, Cultural heritage, Community benefits and Geodiversity: Soils with possible but as yet unproven (prior to being revealed by construction) archaeological interest; Soils supporting community/recreational/educational access to land Source of materials: surface mineral reserves that would remain accessible for extraction

Sensitivity (in-situ soils)	Soil resource
Low	Biomass production: ALC grades 4 & 5 or LCA grades 4.1 to 7 or Urban soils Ecological habitat, soil biodiversity and platform for landscape: Soils supporting valued features within non-designated notable or priority habitats/landscapes. Agricultural soils Soil carbon: Mineral soils Soil hydrology: Pathway for local water flows and flood risk management Archaeology, Cultural heritage, Community benefits and Geodiversity: Soils supporting no notable cultural heritage, geodiversity nor community benefits; Soils supporting limited community/recreational/ educational access to land Source of materials: Surface mineral reserves that would remain accessible for extraction
Negligible	As for low sensitivity, but with only indirect, tenuous, and unproven links between sources of impact and soil functions

Receptor sensitivity for groundwater

Sensitivity criteria for groundwater, derived from professional judgement, are defined in the **Table 2** below.

Table 2: Receptor sensitivity for groundwater

Sensitivity	Criteria guide
High	The receptor has low ability to absorb change without fundamentally altering its present character and is of high environmental value or of national importance. In terms of hydrological receptors, this relates to principal aquifers (within groundwater Source Protection Zones).
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character and has some environmental value or is of regional importance. In terms of hydrological receptors this relates to principal aquifers (outside of groundwater Source Protection Zones) and secondary (A, B or undifferentiated) aquifers (within groundwater Source Protection Zones).
Low	The receptor is tolerant of change without detriment to its character and is of low environmental value or local importance. In terms of hydrological receptors this relates to secondary (A, B or undifferentiated) aquifers (outside of Groundwater Source Protection Zone) and non-designated aquifers.

Magnitude of Impact for land and soil

Where an impact is considered to be present, the magnitude of the impact is classified using the criteria presented the **Table 3** below, which are derived from the

IEMA Guide A New Perspective on Land and Soil in Environmental Impact Assessment[22].

Table 3: Land and soil magnitude of impact

Magnitude of impact (change)	Description of impacts restricting proposed land use
Major	Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), over an area of more than 20ha or loss of soil-related features, as advised by other topic specialists in EIA team (including effects from 'temporary developments'*) or Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 20ha, or gain in soil-related features, as advised by other topic specialists in EIA team (including effects from 'temporary developments'*)
Moderate	Permanent, irreversible loss of one or more soil functions or soil volumes, over an area of between 5ha and 20ha or loss of soil-related features, as advised by other topic specialists in EIA team (including effects from 'Temporary Developments'*) or Potential for improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of between 5ha and 20ha, or gain in soil-related features, as advised by other topic specialists in EIA team
Minor	Permanent, irreversible loss over less than 5ha or a temporary, reversible loss of one or more soil functions or soil volumes, or temporary, reversible loss of soil-related features, as advised by other topic specialists in EIA team. or Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of less than 5ha or a temporary improvement in one or more soil functions due to remediation or restoration or off-site improvement, or temporary gain in soil-related features, as advised by other topic specialists in EIA team
Negligible	No discernible loss or reduction or improvement of soil functions or soil volumes that restrict current or proposed land use
** Temporary developments can result in a permanent impact if resulting disturbance or land use change causes permanent damage to soils.*	

[22] Institute of Environmental Management & Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (2022). Available online: IEMA publishes new land and soils guidance - IEMA

Magnitude of Impact for groundwater

Where an impact is considered to be present, the magnitude of the impact is classified using the criteria presented in **Table 4** below, which are derived from professional judgement. Impacts can be positive or adverse.

Table 4: Groundwater Magnitude of Impact

Magnitude of impact	Criteria guide
High	Total loss or major alteration to key elements or features of the baseline conditions to the extent that post-development character or composition of baseline conditions will be fundamentally changed.
Medium	Loss or alteration to one or more key elements or features of the baseline conditions to the extent that post-development character or composition of the baseline conditions will be materially changed.
Low	Minor shift away from baseline conditions. Changes arising will be detectable but not material; the underlying character or composition of the baseline conditions will be similar to the pre-development situation.
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a 'no change' situation.

Significance of effect for land and soil

The significance of effect is based on the sensitivity of the receptor and the magnitude of impact, as outlined in **Table 5** below (derived from IEMA guidance[23]). The significance of effect can be adverse or positive.

The significance of an effect is reported as either 'significant' or 'not significant'. Any effects that have been determined as 'Moderate' or above are considered to be significant. Any effects that have been determined as 'Slight' or below are considered not significant.

Table 5: Land and Soils Significance of Effect Criteria

		Magnitude of Impact				
		No Change	**Negligible**	**Minor**	**Moderate**	**Major**
Sensitivity	**Very High**	Neutral	Slight	Moderate or Large	Large or very large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate

[23] Institute of Environmental Management & Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (2022). Available online: IEMA publishes new land and soils guidance - IEMA

		Magnitude of Impact				
		No Change	**Negligible**	**Minor**	**Moderate**	**Major**
	Negligible	Neutral	Slight	Slight	Neutral or Slight	Slight

Significance of effect for groundwater

The significance of effect is based on the sensitivity of the receptor and the magnitude of impact, as outlined in **Table 6** below (based on professional judgement).

The significance of an effect is reported as either 'significant' or 'not significant'. Any effects that have been determined as 'Moderate' or above are considered to be significant. Any effects that have been determined as 'Minor' or below are considered not significant.

Table 6: Groundwater significance of effect criteria

		Magnitude of Impact			
		Negligible	**Low**	**Medium**	**High**
Sensitivity	**High**	Negligible effect	Moderate or Minor effect	Major or Moderate effect	Major effect
	Medium	Negligible effect	Minor effect	Moderate effect	Major or Moderate effect
	Low	Negligible effect	Minor effect or negligible effect	Minor effect	Moderate or Minor effect

Appendix 9-3: Environmental Measures

Embedded Mitigation Measures

A number of mitigation measures will be applied within our Project, and this preliminary assessment has been based on the principle that these measures have been 'embedded' into the design of our Project to remove potential significant effects as far as practicable. For example, this includes the considered placement of infrastructure.

Embedded (primary) environmental mitigation measures are considered to be an inherent part of our Project. Embedded mitigation measures relevant to this preliminary land, soil and groundwater assessment include (but are not necessarily limited to) the following:

- Where not used for Solar PV development, BESS, or substations, prioritise the use of non-BMV land for the creation of legacy/permanent habitats where practicable.
- All internal access tracks and cable routes will use existing tracks, crossings and/or gaps in the hedgerows wherever practicable.
- Cabling routes will run alongside access tracks as much as possible to avoid wider excavations.

Additional Mitigation

Construction and decommissioning phases

In order to minimise likely effects relating to land contamination and to protect groundwater, additional mitigation during the construction and decommissioning phases will include the following:

- An Outline Construction Environmental Management Plan (oCEMP) and an Outline Decommissioning Environmental Management plan (DEMP) will be submitted in support of and secured by the DCO. The oCEMP and DEMP will be implemented and managed by the contractor undertaking the works. The oCEMP and DEMP will set out measures to avoid, minimise or mitigate effects on the environment. This would include procedures to mitigate against erosion and contaminated land and include emergency procedures to manage accidental spillages and leaks.
- The construction and decommissioning phases of work would be audited and monitored against the requirements of the oCEMP/DEMP by the contractor to ensure adherence.

With respect to soils and agricultural land, the following additional mitigation measures will be adhered to:

- An outline Soil Management Plan (oSMP) will be submitted in support of and secured by the DCO to manage any potential impacts to the soil (and agricultural land) during and on completion of the construction phase, and during the decommissioning phase. The oSMP will identify those areas within our Site that may be more susceptible to damage, for example, the temporary access tracks, construction compounds and steep slopes; and will set out details of when soil handling should be avoided (for example when it is wet or after periods of heavy rainfall or high winds) and it will advise on when soils are suitable for being handled or trafficked. The oSMP will also detail measures for soil management and follow the principles of best practice to maintain the physical properties of the soil, with the aim of restoring the land to its pre-construction condition following the temporary construction use and at the end of the lifetime of our Project, after decommissioning. Soil protection measures during construction, operation and decommissioning include:
  - Areas for landscaping should be left undisturbed wherever possible and should be fenced off from the works areas to preserve soil quality.
  - The management of trafficking on the land when the soil is in a suitable dry condition is key to managing the risk of soil compaction. All traffic should keep to defined routes across our site to contain the risk of soil compaction. As a general guide, construction works should avoid or undertake minimal traversing across our site and soil handling during the period early December to late March.
  - The soil moisture state should be assessed on site by a suitably qualified person prior to any work commencing and after rainfall events. Soil should only be handled when dry and friable.
  - Machinery with tracks or low ground pressure tyres should be used to spread the weight and minimise compaction.
  - If it is not possible to strip topsoils when they are below the plastic limit, they should be deposited into windrows prior to lifting them into their final bund once they have dried out sufficiently.
  - Stripped soils should be stored in designated bunds, normally close to their final destination ready for use. They should always be stored off the floodplain to preserve the soil and water quality.
  - Topsoil should be stored in bunds up to 3m high to minimise damage during storage.
  - Soils should be placed in stores for as short a time as possible, whilst minimising damage to the soil or site.
  - All bunds which will be in place for more than 6 months should be sown with a low maintenance grass seed mix.
  - Restoration should start at the furthest point from each site exit to ensure that soils once deposited are not trafficked by earth moving machinery.
  - Subsoil compaction should be removed prior to replacing the topsoil.

- Topsoil should be reinstated to its full depth, maintaining and tying into the original contours on either side of the strip to allow surface water flow.
- Timing of cultivation operations will be critical to the success of the restoration with the soils only being worked when in a dry and friable condition.
- Reinstatement of soil should be monitored by a suitably qualified competent person.
- Permanent post construction drainage may be required as part of land reinstatement and existing drainage will be replaced if damaged to ensure continued use. Any existing drains which are cut off/damaged by the works should be diverted into local drainage traps, to minimise sediment release.
- On completion of the restoration works the soils will be in a fragile condition and all work should be geared towards stabilising the soil structure and establishing a strongly growing crop to ensure the best chance of a successful and sustainable restoration.

> The construction and decommissioning phases of work would be audited against the requirements of the oSMP by the contractor to ensure adherence.

Operational phase

Based on the assessment of preliminary environmental information, potential impacts to land contamination and groundwater will be principally managed and secured by the implementation of an outline Operational Environmental Management Plan (oEMP), which will summarise measures to prevent damage to the land during the operation of our Project.

Additional mitigation measures relating to groundwater protection include:

> Pile depths would be minimised, where practicable, and areas of impermeable surfaces will be designed to ensure groundwater infiltration and any risk of groundwater flooding is mitigated.

> Measures to avoid, minimise or mitigate effects on the environment will be documented within and secured by the oEMP. This would include best practice procedures, including measures for pollution prevention and emergency procedures to manage accidental spillages and leaks.

Further information will be provided relating to the procedures to manage the potential impact of firewater (which may contain chemicals from firefighting substances.

With respect to soils and agricultural land, embedded mitigation has addressed some potential effects. Other mitigation includes:

> Measures to ensure the quality of the land is maintained throughout the operational phase of our Project will be documented within and secured by the oSMP and the oEMP. The oSMP will identify those areas within our Site which may be more susceptible to damage (for example, steep slopes); and conditions when it would not be appropriate to handle the soil (for example when it is wet or after periods of heavy rainfall or high winds). The oSMP will also detail measures for soil management and follow the principles of best practice to

maintain the physical properties of the soil, with the aim of maintaining the condition of the land until the end of the lifetime of our Project.

- While the potential impacts on soils during the operational phase are expected to be minimal, good practice will be employed to ensure that any works (such as the maintenance and the management of the land underneath the Solar PV Modules) will be undertaken in a manner that prevents damage to the soil resource, so far as practicable.
- The land within our Site, including the land underneath the solar PV panels and within the field margins, will be managed through the implementation of an Outline Landscape and Ecological Management Plan (LEMP), which will be submitted in support of and secured by the DCO. This Plan will set out requirements for the management and remediation of vegetation during the operational phase to ensure the planting is sustained for the life of our Project.

one earth

solar farm