Great North Road Solar and Biodiversity Park

Environmental Statement

Volume 4 – Technical Appendices

Technical Appendix A17.2 – Outline Soil Management Plan - Part 1 of 4

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GREAT NORTH ROAD
SOLAR AND
BIODIVERSITY PARK

OUTLINE
SOIL MANAGEMENT PLAN
(oSMP)

June 2025

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Authorised By APK 06/25

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Appendices

1 INTRODUCTION

Elements Green Trent Ltd (''the Applicant'') is bringing forward a Development Consent Order (DCO) application for the proposed development of the Great North Road (GNR) Solar and Biodiversity Park (''the Development'').

2 The Development is a proposed solar photovoltaic (PV) electricity generating facility which lies within the district of Newark and Sherwood and the county of Nottinghamshire.

3 This Outline Soil Management Plan (oSMP) has been prepared by Tony Kernon of Kernon Countryside Consultants Ltd and draws on a detailed Agricultural Land Classification (ALC) and soil survey carried out by Amet Property Ltd.

2 THE DEVELOPMENT

The Development would be located to the northwest of Newark, in the Newark and Sherwood district of Nottinghamshire, East Midlands. The Development would be within an area bound by the Order Limits. The Order Limits are to the west of the A1, north of the A617, east of Eakring, and south of Egmanton, to the north and northwest of Staythorpe.

5 The Development is described by ES Chapter 5, Development Description, [EN010162/APP/6.2.5], and briefly summarised here. The Development essentially consists of discrete land parcels proposed to be occupied by solar PV panels and associated infrastructure (Work no. 1), connected by cable route areas (Work no. 2). Up to 4 intermediate substations (Work no. 4) will be spaced around the solar areas, and a Battery Energy Storage System (BESS; Work no. 5a) and 400 kV Compound (Work no. 5b) will collate the electrical energy and step up the voltage before cabling it to the National Grid Staythorpe Substation (Work no. 6), possibly via the Consented Staythorpe BESS (Work no. 7). Road works (Work no. 8; access) will be undertaken, principally to create passing places and create or upgrade access points. Other areas within the Order Limits are identified for mitigation/enhancement (Work no. 3). The Work Areas are

shown on ES Figure 5.1 [EN010162/APP/6.3.5.1] and a summary of mitigation/enhancement measures is shown on ES Figure 5.2 [EN010162/APP/6.3.5.2].

Purpose and Scope of the Document

1.1 This outline Soil Management Plan (oSMP) sets out the key principles and considerations for the handling of soils during construction, operation and decommissioning of the Development. A final Soil Management Plan (SMP), which accords with this oSMP, will be developed based on the detailed design post consent. It will be submitted to NSDC for approval prior to construction commencing and secured by a DCO Requirement.

Structure of Report

1.4 This oSMP sets out an outline of soil management for specific work areas, based on the type of works required in each. For the construction phase, they have been grouped as follows:

- Works no. 1 Solar PV and Work no. 8 Access Works. This includes the installation of PV arrays, internal tracks, internal cabling, fencing, CCTV etc.
- Work no. 2 Cables. This includes the cable route corridor but all work areas will be impacted by cables.
- Work no.3 Mitigation / enhancement will involve the creation of two ponds (7m x 7m and 1.5m deep), scrapes up to 50m2 and graded to a maximum depth of 30cm. Tree and hedgerow planting will not impact soils.
- Works no. 4 Intermediate substations, Work no. 5a BESS and Work no. 5b 400kV, Work No. 6 National Grid Staythorpe Substation and connection point and Work no. 7 Consented Staythorpe BESS and Connection already contain infrastructure but some areas will be impacted by cabling.

1.7 This oSMP sets out:

- The soil resource in section 2;
- The key principles of soil management and soil suitability testing in sections 3 and 4;
- Construction in Works no. 1, 3 and 8 in section 5;

- Construction in Works no. 2 in section 6;
- Construction in Work no. 4, 5a, 5b, 6 and 7 in section 7;
- The operation phase in section 8; and
- The principles of decommissioning in section 9.

1.8 Implementation of the SMP, and adherence to its principles, will be the responsibility of the Applicant who will appoint a competent Principal Contractor to implement onsite.

2 THE SOIL RESOURCE

2.1 The soils have been assessed as part of the Agricultural Land Classification (ALC) survey carried out by Amet Property Ltd.

2.2 The survey has identified the following soils across the Order Limits. The soils in each Block are described in **Table SMP1**.

Table SMP1: Summary of Soils Identified

Block	Soils
A	To the north and west – Worcester Association – slowly permeable non-calcareous and calcareous reddish clayey soils over mudstone, shallow on steeper slopes. Around watercourses – Compton Association – stoneless mostly reddish clayey soils affected by groundwater. To the southeast – Whimple 3 Association – reddish fine loamy or fine silty over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.
B	To the west – Worcester Association – slowly permeable non-calcareous and calcareous reddish clayey soils over mudstone, shallow on steeper slopes. Around watercourses – Compton Association – stoneless mostly reddish clayey soils affected by groundwater. To the northeast – Whimple 3 Association – reddish fine loamy or fine silty over clayey soils with slowly permeable subsoils and slight seasonal waterlogging. To the east – Arrow Association – deep permeable coarse loamy soils affected by groundwater.
C	The centre of the site – Brockhurst 1 Association – slowly permeable, seasonally waterlogged reddish fine loamy over clayey soils. To the north west, east and south – Worcester Association – slowly permeable non-calcareous and calcareous reddish clayey soils over mudstone, shallow on steeper slopes.
D	To the west – Worcester Association – slowly permeable non-calcareous and calcareous reddish clayey soils over mudstone, shallow on steeper slopes.

Block	Soils
	Around watercourses – Compton Association – stoneless mostly reddish clayey soils affected by groundwater. To the east – Arrow Association – deep permeable coarse loamy soils affected by groundwater.
E	On the higher ground – Brockhurst 1 Association – slowly permeable, seasonally waterlogged reddish fine loamy over clayey soils. Around watercourses – Compton Association – stoneless mostly reddish clayey soils affected by groundwater. Between the higher ground and watercourses from about half way down the slopes – Worcester Association – slowly permeable non-calcareous and calcareous reddish clayey soils over mudstone, shallow on steeper slopes. The fields nearest to Eakring – Hodnet Association – reddish fine and coarse loamy soils with slowly permeable subsoils and slight seasonal waterlogging.
F	Most of this site – Worcester Association – slowly permeable non-calcareous and calcareous reddish clayey soils over mudstone, shallow on steeper slopes. Around watercourses – Compton Association – stoneless mostly reddish clayey soils affected by groundwater. Around Kneesall Lodge and either side of the A616 – Salop Association – slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils. While there are a variety of different soil types identified across the various parts of the site they are fairly consistent, being slowly permeable reddish clayey soil across most of the fields with the areas closest to the A1 recorded as being deep coarse loamy soils.
G	To the west – Worcester Association – slowly permeable non-calcareous and calcareous reddish clayey soils over mudstone, shallow on steeper slopes. Around watercourses – Compton Association – stoneless mostly reddish clayey soils affected by groundwater. To the east – Arrow Association – deep permeable coarse loamy soils affected by groundwater.

2.3 Soils are shown in the following photographs purely to illustrate soil characteristics and to indicate colours and the boundary between topsoils and subsoils. The field parcel numbers are reproduced in **Appendix SMP1**. These are the Works Plans with field parcels idenfied.

2.4 The land classification results are set out on five plans in **Appendix SMP2**. Typical soils are shown in the following photographs.

Photos 1 – 3: Grade 2 Soils, Parcel 199, reddish clayey soils

Photos 4 and 5: Subgrade 3a in Parcel 79, reddish fine loamy soils


Photos 6 and 7: Subgrade 3b, Parcel 199, reddish clayey soils affected by groundwater


Photos 8 and 9: Subgrade 3b in Parcel 244, reddish clayey soils over mudstone

Photos 10 and 11: Subgrade 3b in Parcel 16, deep permeable loamy soils over sand

3 KEY PRINCIPLES OF SOIL MANAGEMENT

Guidance

3.1 Soil management principles are set out in a number of documents, but those of most relevance are:

- Code of Practice for the Sustainable Use of Soils on Construction Sites, Defra (March 2011) (extracts in **Appendix SMP3)**;
- Working with Soil Guidance Note on Benefitting from Soil Management in Development and Construction, British Society of Soil Science (v 3 January 2022) (**Appendix SMP4**);
- Good Practice Guide for Handling Soils in Mineral Workings, The Institute of Quarrying (July 2021) (extracts in **Appendix SMP5**);
- Building on Soil Sustainability: principles for soils in planning and construction, Cornwall Council and others (September 2022) (**Appendix SMP6**);
- Planning and aftercare advice for reclaiming land to agricultural use, Natural England (April 2022), especially in respect of soil bund management (**Appendix SMP7**)

Overview

3.2 The installation of the solar PV panels and mounting structures, which forms the majority of Works No. 1 Solar PV, involves no movement or disturbance of soils. Other works such as the installation of inverters, construction compounds, access tracks will disturb soils. Soils will also need to be disturbed to enable cables to be laid (Works no.1 Solar PV and Work no.2 Cables), but the soils will be reinstated shortly after they are lifted out (i.e. this is a swift process).

3.3 For those areas where soil needs to be disturbed to create the bases for the substation and some fixed equipment (within Works no. 1 , 4 and 5), the soil will be stored in suitably-managed conditions. The soil needs to be maintained after construction as it is needed at the decommissioning phase, to restore the land under the bases back to agricultural use.

3.4 For the cabling (principally within Works no. 1 and 2 but also within other Works no.) trenches will be required, and when dug topsoil and subsoil will be kept separate. It will be evident where topsoil becomes subsoil. In most places the topsoil is about 30cm – 35cm deep, with a graduation to a lighter-coloured subsoil, as shown in the photographs in section 2 describing the soil resource.

3.5 Purely for illustration the following pit, and soil profile, from some of the Subgrade 3b land within the Order Limits shows the clear distinction between topsoil and subsoil. Experienced site operatives will be familiar with this distinction.

Photos 12 - 15: Pit showing topsoil and subsoil distinction

3.6 Temporary works, to create construction compounds and temporary accesses will be short term. Where soil needs to be disturbed, it will be stored carefully for replacement in the same areas.

Principles on Timing

3.7 For the majority of the Development soils do not need to be disturbed. The principle effects on agricultural land quality and soil structure are therefore limited to the effects of vehicle tracking. Therefore, the key consideration is to ensure that soils are passed over by vehicles (trafficked) when the soils are in a suitable condition, and that if any localised damage or compaction occurs (which is also common with normal farming operations), it is ameliorated suitably, such as by light cultivation prior to re-seeding.

3.8 The key principles for successfully avoiding damage to soils are:

1. Timing;
2. Retaining soil profiles;
3. Avoiding compaction;
4. Ameliorating compaction.

Timing

3.9 The most suitable management decision/action to avoid adverse effects on soils is the timing of works. If the construction work takes place when soil conditions are sufficiently dry, then damage from vehicle trafficking and trenching will be minimal.

3.14 As a general rule any activity that requires soil to be dug up and moved, such as cabling works, should be minimised during the winter. Soils handled when wet tend to lose some of their structure, and this results in them taking longer to recover after movement, and potentially needing restorative works (e.g. ripping with tines) to speed recovery of damaged soil structure. The period when soils are most likely to be saturated, and therefore assessing soils before works commencing is important, as shown below.

Table SMP2: Typical Unsuitable Period for Working with Soils

Soil Type	Likely Period When Soil Suitability Tests Are Important
Subgrade 1, 2 and 3a	November to March (December to February in dry years)
Subgrade 3b	November to March (December to February in dry years)

3.15 Works within these periods may be able to take place, but it will be necessary to carry out soil suitability tests more frequently as there will be times within those periods when soils will be too wet to handle.

3.16 Soil handling/assessment guidelines are set out in section 4.

3.17 The equipment used to construct solar farms is generally lightweight, as explained later in section 5. It is unlikely that deep compaction will be caused, even with travel in suboptimal conditions. If access is needed to areas when ground conditions are not suitable, it may be possible to lay temporary surfacing (as described in section 5) or to use very low ground pressure machinery, to enable access and work without significant disturbance to soils. These mitigation measures could allow access. Soils should not be moved, however, when unsuitably wet.

3.18 In localised instances where it is not possible to avoid undertaking construction activities when soils are wet and topsoil damage occurs then soils should be recovered by normal agricultural management, using normal agricultural cultivation equipment (subsoiler, harrows, power harrows etc) once soils have dried adequately for this to take place. There may be localised wet areas in otherwise dry fields, for example, which are difficult to avoid.

3.10 Vehicle travel over soils creating limited impact is shown below. This is good practice and is to be aimed-for, so far as possible.

Photo 16: Soils Suitable for Trafficking

3.11 Poor practice is shown below. If this type of soil disturbance occurs it can be rectified, as set out below, but as a point of principle if soils are rutting as shown in Photo 17 they are not well suited to being trafficked. Work should, so far as possible, be delayed until soils dry out.

Photo 17: Soils not Suitable for Trafficking [NOTE: This is a photograph showing poor practice and does not relate to any of the Applicant's sites]

3.12 The heavier silty-clay and clayey soils identified in section 2, which are widespread across the western parts of the Order Limits, will be most susceptible to this issue. Minimising travel over those soils from November to March in most years is recommended, but in wet years this period could be extended. Guidance on limiting or avoiding soil damage in these areas is given in section 5.

3.13 The lighter soils of the eastern area of the Order Limits are less prone to rutting, and can be worked for much of the year, generally requiring extra care in the December to February period. However, as these areas are intermixed with heavier soils, separate working practices are not considered to be feasible. Soils from Parcel 16, illustrate the sandier soils, as shown in photos 18 and 19 below. These can be worked for much of the year, even during wetter conditions.

Photos 18 and 19: Pit and soils showing clear colour distinction

3.19 **Retaining Soil Profiles**. The successful installation of cabling at depths of >60cm requires a trench to be dug into the ground. Topsoil depths vary across the Order Limits but the coverage is generally about 30cm, with subsoils below that being generally similar to depth. As set out in the BRE Agricultural Good Practice Guidance for Solar Farms (extract at **Appendix SMP8**) at page 3:

"When excavating cable trenches, storing and replacing topsoil and subsoil separately and in the right order is important to avoid long-term unsightly impacts on soil and vegetation structure. Good practice at this stage will yield longer-term benefits in terms of productivity and optimal grazing conditions".

3.20 In those areas where the soil is dug up (especially for trenching or creating access tracks, the soils should be returned in as close to the same order, and in similar profiles, as it was removed.

3.21 **Avoiding Compaction**. It is stressed that the objective of the oSMP is to avoid causing compaction. Compaction by normal machinery is very unlikely to affect land quality, but it results in the need for physical ameliorating with consequent cost implications. It should be avoided wherever possible.

3.22 This oSMP sets out when soils should generally be suitable for being trafficked. There may be periods within this window, however, when periodic rainfall events result in soils becoming liable to damage from being trafficked or worked. In these (likely rare) situations, work should only continue with care, to minimise structural effects on the soils, until soils have dried, usually within 48 hours of heavy rain stopping.

3.23 **Ameliorating Compaction**. If localised compaction occurs during construction, it should be ameliorated. This can normally be achieved with standard agricultural cultivation equipment, such as subsoilers (if required), power harrows and rolls.

3.24 The amount of restorative work will vary depending upon the localised impact. Consequently, where the surface has become muddy, for example in the photograph below, this can be recovered once the soil has dried, with a tine harrow and, as needed, a roller or crumbler bar.

Photos 20 and 21: Inter-row Localised Soil Disturbance and Subsequent Restoration

3.25 If there are any areas where there has been localised damage to the soils due to vehicle passage, for example, a low wet area within a field which despite best efforts could not be avoided, this should be made good and reseeded at the end of the construction stage, when conditions are suitable. This is illustrated below.

Photo 22: Localised Restoration

3.26 The soils across the Order Limits, provided they have dried sufficiently, will readily restore. The ruts need to be harrowed level when the ground is dry, and then they will naturally restore.

3.27 Accordingly the ground surface should be generally levelled prior to any seeding or reseeding.

4 SOIL SUITABILITY TESTS

4.1 The soils across the Order Limits are generally able to be worked (i.e. physically moved) between April and October. Avoiding the November to March period if possible is recommended, however typical short-term access can be provided by removable trackways, such as shown in Section 5.2. Vehicle traffic will normally need to be avoided between November/December and February/March, depending upon rainfall.

4.2 The heavier clayey soils are most susceptible to traffic damage when wet. They will therefore need to be assessed after prolonged rain, depending upon the activities proposed.

4.3 Guidance on determining soils suitability to be handled is set out in the Good Practice Guide for Handling Soils, **Appendix SMP5**.

4.4 If you can roll soil into a ball or a sausage easily and the soil holds that shape, it is too wet to travel over or move soils. This is illustrated in the photographs below.

Photos 23 to 24: Soils too wet to handle

Field 261, November 2024

Field 47, November 2024

4.5 If the soils once rolled then cannot be held in this manner and break or crumble, as shown below, they are likely to be suitable for being handled. See the test methodology in **Appendix SMP5**.

Photos 25 and 26: Soils suitably dry to handle (not from this site)

4.6 The following soils, not from the Order Limits, show another example where soils crumble and are suitable for being moved and handled.

Photos 27 and 28: Suitably Dry Soils

4.7 As described in the Good Practice Guide (**Appendix SMP5**), sandy soils are normally impossible to roll into a thread. Instead an Examination Test must be used, rolling the soils into a ball to see if the sample darkens when squeezed

indicating excess water. If it does not, as the example below (from Parcel 16), it is suitable for being handled.

Photos 29 and 30: Examination Test, Parcel 16

4.8 Please note that there is a typing error on the extract in **Appendix SMP5.** Sandy soils are impossible to roll into a thread, not possible as stated at the bottom of Table 4.2.

5 CONSTRUCTION IN WORKS No. 1, 3 & 8

5.1 This section covers:

(i) Temporary access works;

(ii) Construction compounds;

(iii) Mitigation / Enhancement

(iv) Solar arrays and on-site trenching;

(v) Internal cabling;

(vi) Internal tracks;

(vii) Site fencing;

(viii) Underfield drainage.

Temporary Access

5.2 Typical short-term access can be provided by removable trackways, such as shown below.

Photos 31 and 32: Removeable Temporary Trackways

Construction Methodology for the Construction Compound

5.3 Temporary construction compounds will be created at the start of construction and reinstated at the end.

5.4 Construction compounds are built by either matting over the top of the topsoil, or by stripping topsoil and storing it on the edge of the compound area. A matting is then laid down, and typically stone imported and levelled, as shown below.

Photo 33: Newly-laid Construction Compound (Elsham-Lincoln Pipeline)

5.5 The matting prevents the stone from mixing with the subsoil, as shown below.

Photo 34: Matting

5.6 Topsoil if removed will be stored short-term, such as shown below. If soils are still wet when moved, the storage should be no higher than 1m, but otherwise temporary storage can be up to 3m in height. The soils need to be sufficiently dry to handle.

Photo 35: Topsoil Storage Example

5.7 Guidance on determining soils suitability to be handled is set out in the Good Practice Guide for Handling Soils, **Appendix SMP5** and in section 5.

5.8 As described in this oSMP, most of the soils across the Order Limits will be suitable for being moved for much of the year. However, after prolonged periods of rain, especially in the November to March period, the advice in section 4 on assessing suitability should be followed. Generally, the programme seeks to avoid working the soils in this period.

5.9 The topsoils will be stripped to a depth of 30cm, and placed in short-term storage in locations not at risk of flooding. Short term storage of soil is shown above. If the soil is likely to be stored for in excess of six months then, depending upon timing, it will be seeded with grass. This binds the soil together and minimises erosion.

5.10 Therefore if the construction compounds are not to be removed before the wet weather (normally November to March), the bunds should be seeded with grass, as per the example below, at a suitable time of the year. The compound can then be reinstated after April the following year.

Photo 36: Grass-seeded Soil Storage

5.12 The base area should be loosened when soils are dry and the topsoil then spread over the site to the original depth. This should be lightly cultivated.

Mitigation / Enhancement

This area (Works no. 3) enhances the baseline biodiversity. The land will be a combination of retained agricultural land (modified use to benefit biodiversity), woodland, and the creation of terrestrial habitats (semi-natural). All of these are likely to benefit the soil and not require any soil movement.

Only the creation of freshwater habitats, such as ponds and scrapes, will require the movement of soil.

Solar PV Arrays

5.13 Installation of Solar PV Arrays can take place once soils are sufficiently dry for light vehicle traffic, unless low ground pressure machinery or temporary surfacing has been used.

5.14 Vehicles will traverse the network of access tracks to inverters and typically once the mounting structures have been installed, only small numbers of vehicle movements will be needed between each string of panels.

5.15 The machinery normally used is small, lightweight and tracked, and damage to soils will generally be minimal.

Insert 1 and Photo 37: Example or Leg Piling and Panel Moving Equipment

5.16 Any surface disturbance will be limited, will not result in deep compaction, and can be ameliorated easily in the spring, as described above.

5.17 It is very unlikely that trafficking during construction when soils are relatively dry will result in compaction sufficient to require amelioration. However, if rutting has resulted the soil should be levelled by standard agricultural cultivation equipment such as tine harrows, once the conditions suit, and prior to seeding. This can be done with standard agricultural machinery, or with small horticultural-grade machinery such as is shown below.

Photos 38 and 39: Horticultural Machinery

5.18 The objective is to get the surface to a level tilth for seeding/reseeding as necessary, as was shown earlier.

5.19 Grass growth will then recover or establish rapidly.

Internal Cabling Works

5.20 Cabling is done mostly with either a mini digger or a trenching machine. The cable routing areas are shown on the plans. Trenches will be at varying depths. Topsoil should be placed on one side (0-30cm) and subsoil on the other (below 30cm).

Insert 2: Machinery Used (extract from BRE Good Practice Guidance)

Cable trenching, showing topsoil stripped and set to one side, with subsoil placed on the other side ready for reinstatement (photo courtesy of British Solar Renewables)

5.21 The top 30cm will be dug off and placed on one side of the trench, for subsequent restoration. There is no need to strip the grass first. It is important that topsoils are placed separately to the subsoils, and that they are then put back in reverse order, i.e. subsoils first.

5.22 All trenching work will be carried out when the topsoil is dry and not plastic (i.e. it can be moulded into shapes in the hand).

5.24 If dry and lumpy the subsoils will be pressed down by the bucket to speed settlement. If the soils are settling well no pressing-down is required.

5.25 The topsoil will then be returned onto the top of the trench. It is likely, and right, that the topsoil will sit a few centimetres higher than the surrounding level. This should be left to allow it to settle naturally as the soils become wetter.

5.26 If there is a surplus of topsoil this may be because the lower subsoils were dry and blocky and there are considerable gaps in the soil. These will naturally restore once the lower soils become wet again. If the trench backfilling results in the soil being more than 5-10cm proud of surrounding levels, which is unlikely but possible, the topsoil will not be piled higher. It will be left to the side, and the digger returned to add the rest of the topsoil onto the trench at that point.

5.28 If considered appropriate, a suitable grass seed mix could be spread over any parts of the trenches that would seem likely to benefit from extra grass. Seeding should take place at a suitable time of the year, being the spring or autumn.

Tracks and Small Fixed Equipment

5.29 Track construction involves removing the topsoil, normally to a depth of 30cm, and placing it to the side of the track (therefore enabling easy return to the same place on decommissioning). A geotextile membrane is then spread over the upper subsoil, and the track surface is laid on top.

5.30 The small areas of fixed equipment will stand on a similarly-constructed hardstanding or concrete foundations, requiring some removal of soil to create the foundation.

5.31 Soil stripping should be carried out in accordance with Defra's "Construction Code of Practice for the Sustainable Use of Soils on Construction Sites" (Defra, 2009). The removed soil will be stored in bunds in accordance with the Construction Code of Practice.

Site Fencing and Cameras

5.32 Perimeter fencing will be Deer Fence (timber and wire) and there will be pole mounted internal facing closed circuit television (CCTV) systems. Both can be installed at any time as long as the movement of vehicles is not causing

significant rutting (i.e. more than 10cm). Access gates will be of similar construction and height as the perimeter fencing.

5.33 The following photographs show fencing installed early in the process.

Photos 40 and 41: The Fencing

5.34 CCTV poles are installed in the same way.

Photos 42 and 43: CCTV Poles and Fencing

5.36 Any rutting that results from fencing should be made good with standard agricultural equipment.

Drainage Works

5.37 There is the potential for parts of the Order Limits to have underfield drainage schemes. Prior to construction all efforts will be made with landowners to identify historic maps and records of any known underfield schemes.

5.38 The extent to which there is the potential for an adverse effect will depend upon a number of factors including:

- The depth of drainage;
- The direction and spacing of any underdrainage;
- The extent to which the underdrainage is operational;
- The type of works being undertaken.

5.39 Scanning for clay and plastic pipe field drainage is not possible, and the depth of drainage is not known.

5.40 The Agricultural and Horticultural Development Board advisory guide "Field Drainage Guide: principles, installations and maintenance" (2024) is reproduced in **Appendix SMP9**. This notes that given good maintenance a useful life of a system is at least 20 years, but some systems can last many decades longer (page 4 refers).

5.41 The key consideration in minimising the effects on under-field drainage is to identify the location and depth of the drainage. Page 11 sets out a methodology for identifying the location of field drainage.

5.42 The land classification system assumes that "where limitations can be reduced or removed by normal management operations or improvements, for example cultivations or the installation of an appropriate underdrainage scheme, the land is graded according to the severity of the remaining limitations". This is reproduced in **Appendix SMP10**.

5.43 Consequently any adverse effects on field drainage will not result in a downgrading or change to the ALC grading of the Order Limits.

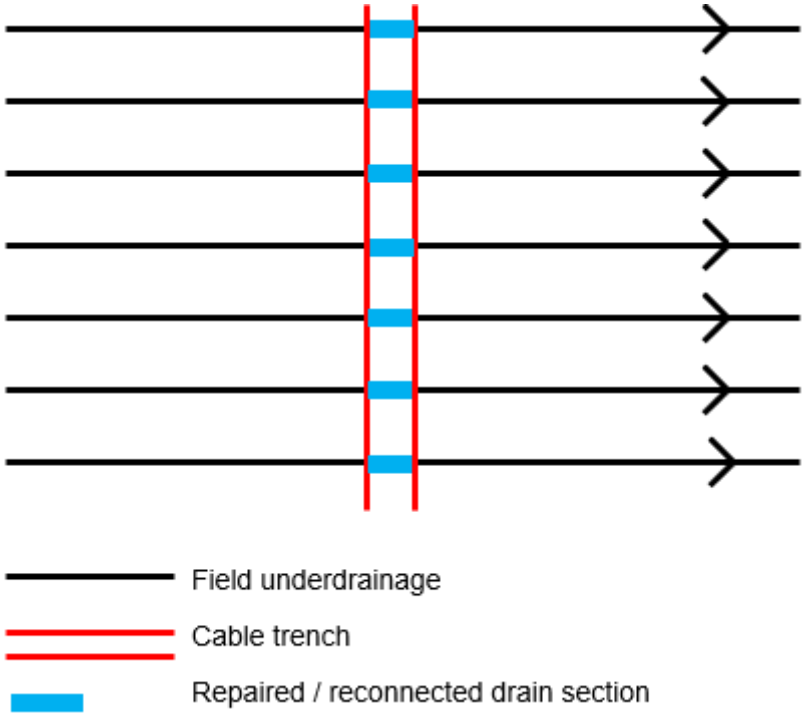
5.44 The installation of cabling will be supervised by an experienced advisor. He or she will know where to expect drainage, and will be able to identify if drainage pipes are broken as either clay pipe fragments or plastic pipe will be evident in the material dug out.

5.45 Those areas affected by cable damage should be repaired in one of two ways:

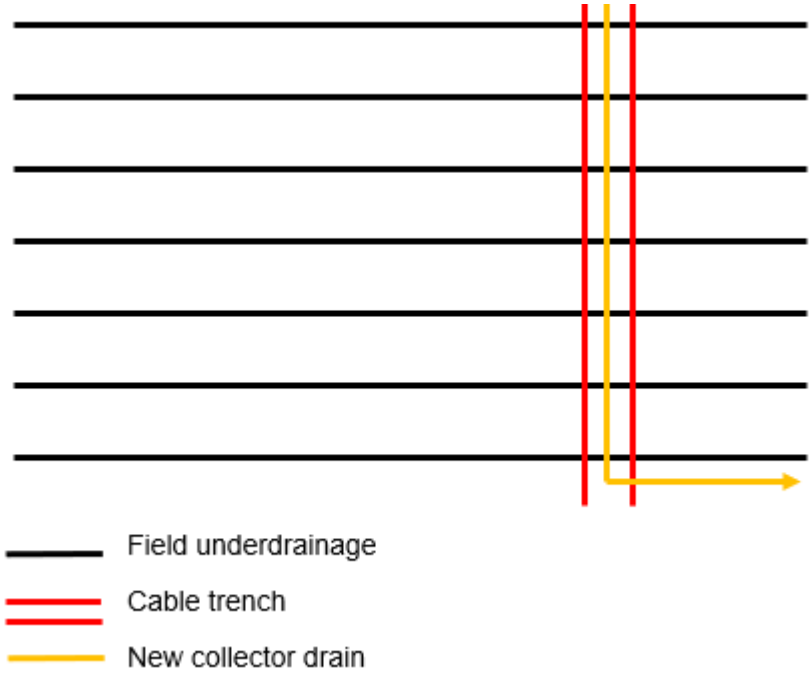
(i) either the individual drains will be reconnected with new sections across the pipe, as illustrated below;

(ii) or a collector drain will be laid along the cable trench and will then connect, at a low point, to a new drainage pipe to take water away.

Insert 3: Drainage System Repair Option



Insert 4: Drainage System Repair Option



5.46 Drains affected by piling will be repaired locally, if required.

5.47 The purpose of under-field drainage is to help crop growth and to extend the time that land can be accessed. Drainage allows earlier and later access to the land, and evens out the drainage across the land to help with cultivations etc.

5.48 Allowing the land to drain less rapidly does not affect the operation of the Development. Vehicular access is normally only needed in the summer months, when panels are cleaned. Having under-field drainage working is not, therefore, important unless there are areas of standing water due to broken drainage.

5.49 Localised wet areas where drainage has been impeded such that surface puddling occurs, will be repaired with new sections of plastic drainage pipes dug around the blocked section to connect the old system.

6 CONSTRUCTION OF CABLE WORKS (WORKS No. 2)

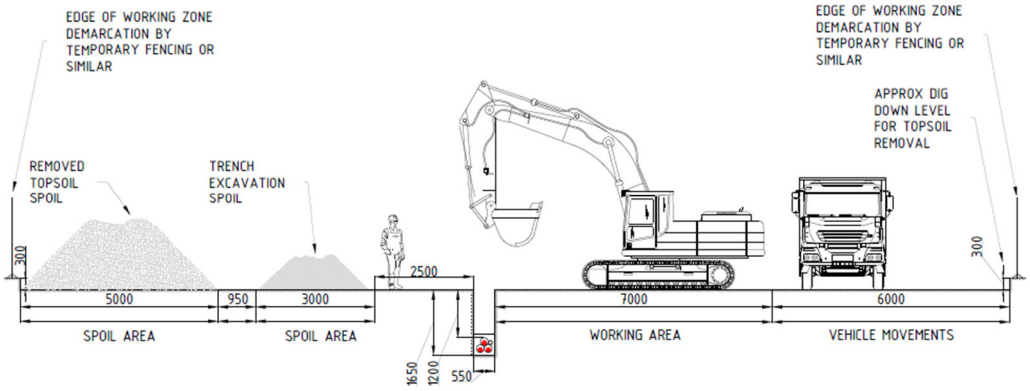
6.1 The works will involve:

Temporary construction compounds, typically shared with those for the solar PV arrays

(i) Stripping of topsoil across the working width, to be stored temporarily in a bund, In some cases the working width may not need to be stripped;

(ii) The trench will then be dug, with the subsoil placed separately to the topsoil.

Insert 5: Example of soil storage



(iii) The cable is then laid into the trench, possibly with some material as protection against stones etc.

(iv) Following cable installation, the subsoil will then be replaced in the trench;

(v) The land is returned to the landowners for continued farming.

Photo 48: Topsoils Having Been Returned for Restoration

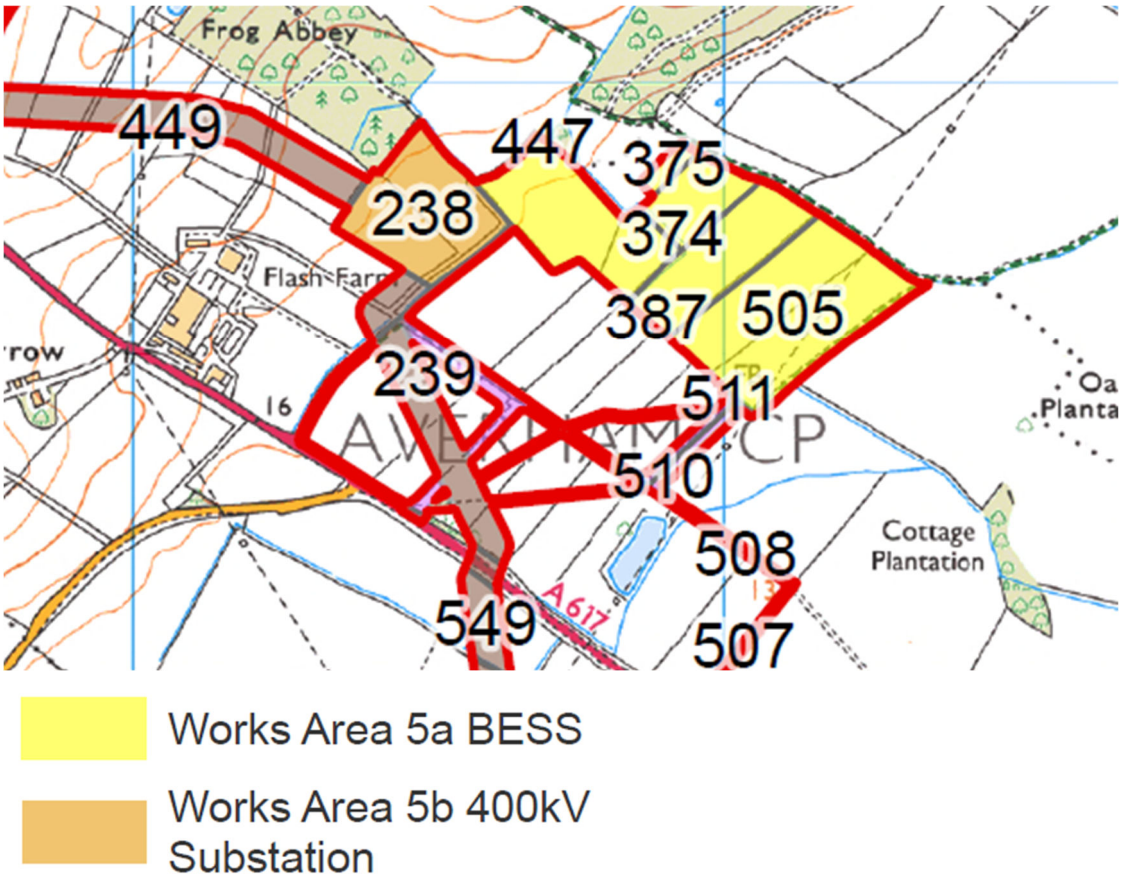
6.2 Similar works are expected across arable and grassland areas. Working widths will vary, narrowing for gaps through hedgerows or widening for deeper excavation areas (eg for Horizontal Directional Drilling (HDD) under transport routes or watercourses).

6.3 Any effects on drainage will be assessed as described in section 5.

7 CONSTRUCTION OF SUBSTATION AND BESS (WORKS AREAS 4, 5a, 5b, 6 and 7)

7.1 The substation and BESS are at the southern end of the Order Limits, as shown on Insert 6.

Insert 6: Substation and BESS



7.2 This is an area of mixed Subgrade 3a and 3b quality. The soils are slowly permeable reddish clayey soils.

7.3 The works include removing the topsoil, for storage, and in places removal of some of the subsoil. Bases, and in places foundations will be built. The whole area will be restored on decommissioning.

7.4 The key is to remove and store the topsoil when conditions are right, following the principles set out in the oSMP. Long-term storage against the guidance in

the Defra (**Appendix SMP3**) and IQ (**Appendix SMP5**) guidance will ensure that soils remain in good condition for the duration of the operational period.

7.5 Subsoil will be stored separately to the topsoil.

7.6 Details of the location and size of the soil storage will be presented in the SMP, including annual maintenance of the bunds, once details of the construction works are finalised.

8 OPERATIONAL PHASE: LAND MANAGEMENT

Solar PV Arrays

8.1 The land around the Solar PV Arrays will be managed including potentially by the grazing of sheep.

8.2 Panels grazed by sheep tend to be free of weeds, as shown below.

Photo 47: Sheep Grazing Under Panels

Ongoing Maintenance

8.4 There are many different cleaners on the market, some tractor based and some operated from smaller machines, such as below.

Photo 48: Cleaning of Solar Arrays

8.5 The normal cleaning period is early summer, so that panels are clean for the maximum light period, so damage is unlikely.

8.6 If vehicles, including farm vehicles, cause ruts in the soil these will naturally repair in time, especially as the land is grazed by sheep and their feet are excellent at levelling land. Alternatively, a light harrow or rolling will restore the ruts, when the soil is still soft enough to roll but hard enough to not rut more.

Photo 49: Ruts Caused by Vehicles

8.7 If vehicles have caused rutting it is probably, as per the example above, only localised.

8.8 Localised, small rutting should be repaired by either treading-in the edges with feet, by light rolling or harrowing, or adding a small amount of soil simply to fill-in the depression so that water does not collect there.

8.9 Deeper rutting will require either light harrowing in the drier period, or some soil adding, or both, before reseeding.

Emergency Repairs

8.10 For the duration of the operational phase there should be only localised and infrequent need to disturb soils, such as for repair of a cable. Any works involving trenching should be carried out, ideally, when the soils are dry but recognising that any works will be those of emergency repair, that may not be possible.

8.11 Accordingly if new cabling is needed and has to be installed in wet periods, it can be expected that the trench will look unsightly initially, such as the example below.

Photo 50: Trench During Wet Period

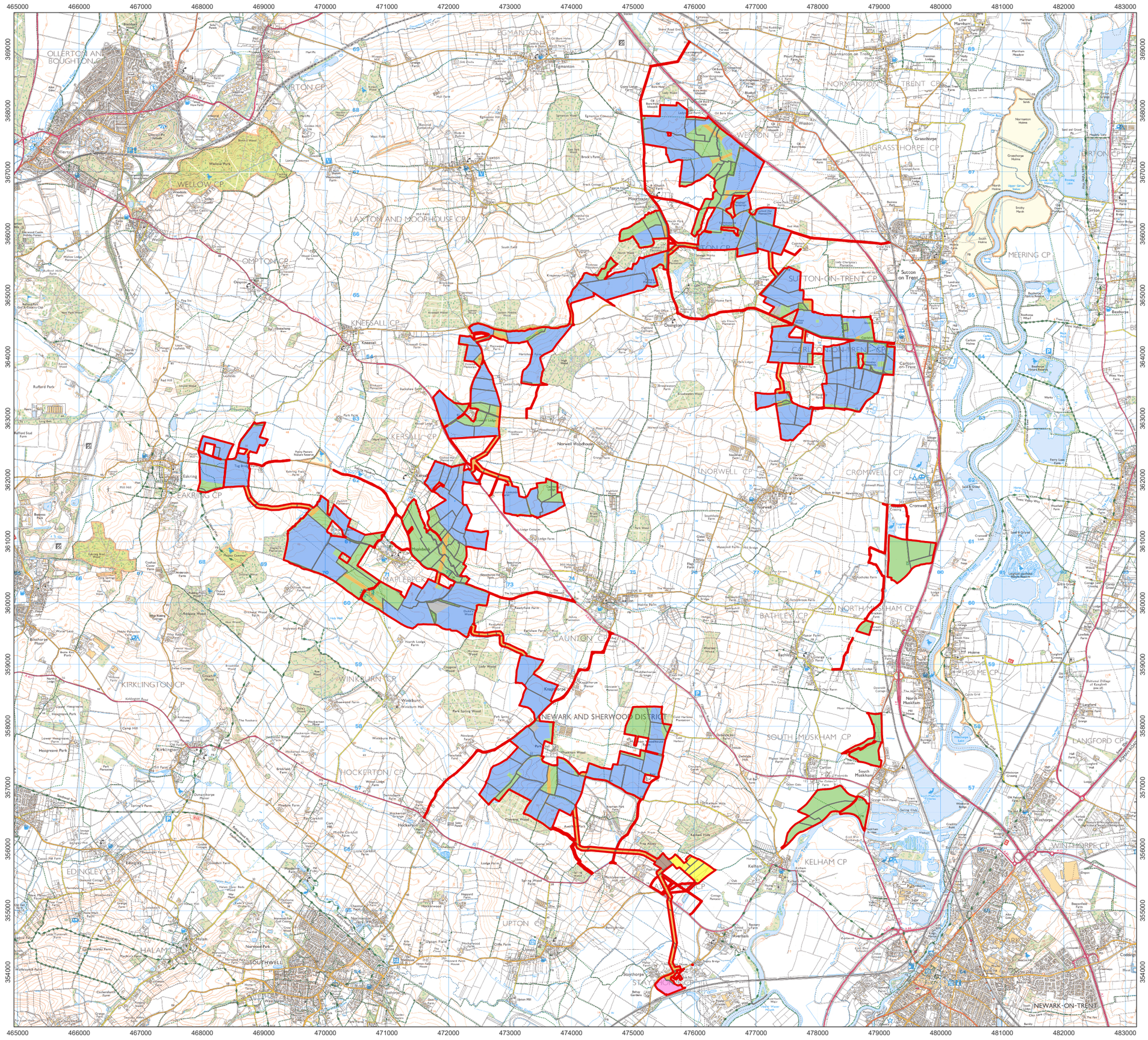
8.12 Any area disturbed will be harrowed or raked level once the soils have dried, and be reseeded. These areas will be small, and this can probably be done by hand.

9 DECOMMISSIONING PHASE LAND MANAGEMENT PRINCIPLES

9.1 Reference should be made to the Outline Decommissioning and Restoration Plan (oDRP) [**EN010162/APP/6.4.5.6**]. The soil will be managed in accordance with the construction processes outlined in this oSMP, but in reverse order.

9.2 Given the length of time before decommissioning it is likely that the ALC methodology will have been amended by then. Further, unless we are successful in reducing global carbon emissions , climate change may have altered the seasons and rainfall patterns. Therefore, this guidance is prefaced with a requirement for a suitably qualified soil scientist to revisit the Order Limits prior to decommissioning, and to update the guidance and timing. The objective is to remove panels and restore all fixed infrastructure areas to return the land to the same ALC grade and condition as it was when the construction phase commenced.

Appendix SMP1
Field Parcel Numbers



Solar & Biodiversity Park

- Order Limits
- Field Boundaries

Works Numbers

- Works No. 1 Solar PV
- Works No. 2 Cable
- Works No. 3 Mitigation
- Works No. 4 Substations
- Works No. 5A BESS
- Works No. 5B 400kV Substation
- Works No. 6 National Grid Substation
- Works No. 7 Staythorpe BESS Connection
- Works No. 8 Access

1:60,000 Scale @ A3

0 0.5 1 2 km

Ref: 026-ES-5.1	Date: 23/06/2025

Works Areas
Figure 5.1

Great North Road Solar and Biodiversity Park
Environmental Statement

Solar & Biodiversity Park

- Order Limits
- Field Boundaries

Works Numbers

- Works No. 1 Solar PV
- Works No. 2 Cable
- Works No. 3 Mitigation
- Works No. 4 Substations
- Works No. 5A BESS
- Works No. 5B 400kV Substation
- Works No. 6 National Grid Substation
- Works No. 7 Staythorpe BESS Connection
- Works No. 8 Access

NW NE SW SE

1:30,000 Scale @ A3

0 0.25 0.5 1 km

Ref: 026-ES-5.1	Date: 23/06/2025

Works Areas
Figure 5.1NE

Great North Road Solar and Biodiversity Park
Environmental Statement