BEACON FEN ENERGY PARK

Planning Inspectorate Reference: EN010151

Outline Soil Management Plan

Document Reference: 6.3, ES Vol.1, 6.3.95 Appendix 14.4

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The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulation 5(2)(a)

Quality information

Prepared by	Checked by	Verified by	Approved by
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Revision History

Revision	Revision date	Details	Authorized	Name	Position
2	25/09/25	Update to include reference to Agricultural Liaison Officer (page 15)		DR	Associate Director
3	16/12/2025	Update to include Restoration standard		DR	Associate Director

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1. Introduction

1.1 Background

1.1.1 This Outline Soil Management Plan (OSMP) has been prepared by Wardell Armstrong LLP ('WA') on behalf of Beacon Fen Energy Park Ltd (the 'Applicant') in support of an application for a Development Consent Order (DCO) for Beacon Fen Energy Park (the 'Proposed Development')

This OSMP has been prepared in fulfilment of the requirements of one of the requirements in Schedule 2 to the Draft **DCO (Document Reference 3.1)** which states (at Requirement 16): (1) *No part of the authorised development may commence until a soil management plan (which must be substantially in accordance with the outline soil management plan as relevant to construction activities) for that part has been submitted to and approved by the relevant planning authority or, where the part falls within the administrative areas of multiple relevant planning authorities, each of the relevant planning authorities.*

(2)*. All construction works associated with the authorised development must be carried out in accordance with the soil management plan approved pursuant to sub-paragraph (1).*

(3). *Prior to the date of final commissioning for any part of the authorised development, a soil management plan (which must be substantially in accordance with the outline soil management plan as relevant to operational activities) for that part must be submitted to and approved by the relevant planning authority for that part or, where the part falls within the administrative areas of multiple relevant planning authorities, each of the relevant planning authorities.*

(4). *The operation of the authorised development must be carried out in accordance with the soil management plan approved pursuant to sub-paragraph (3) and maintained throughout the operation of the relevant part of the authorised development to which the plan relates.*

(5). *Prior to the start of any decommissioning works for any part of the authorised development, a soil management plan (which must be substantially in accordance with the outline soil management plan as relevant to decommissioning activities) for that part must be submitted to and approved by the relevant planning authority for that part or, where the part falls within the administrative areas of multiple relevant planning authorities, each of the relevant planning authorities.*

(6). *The decommissioning of the authorised development must be carried out in accordance with the soil management plan approved pursuant to sub-paragraph (5).*

1.1.2 This OSMP provides guidance on soil management for the Beacon Fen Energy Park and installation of the 400 kV cable to the National Grid Bicker Fen substation.

1.1.3 This OSMP will be developed into separate detailed Soil Management Plans (SMP)'s to support the construction, operational and decommissions phases and these will form a part of a **Construction Environmental Management Plan (CEMP) (Document Ref: 6.3 ES Vol.2, 6.3.7**).

1.1.4 Agricultural Land Classification (ALC) soil surveys have been conducted within the Array Area and the Bespoke Access Corridor to provide baseline soil information to inform the detailed SMP. A soil survey of the Cable Route Corridor will need to be carried out pre-construction to inform the detailed SMP for that area.

1.1.5 The appointed Principal Contractor for the Proposed Development will be responsible for implementing the detailed SMP.

1.1.6 The Proposed Development is situated on land near Heckington, Sleaford, (grid reference: 514531, 347214), Lincolnshire (hereafter referred to as 'the Site').

1.1.7 The Site comprises three different elements: a 529 hectare (ha) Solar Array Area, a 183 ha Cable Route Corridor (including grid extension works), and a 45 ha Bespoke Access Corridor.

1.1.8 This OSMP has been structured to address each of the three elements of the Proposed Development separately.

1.2 Summary of Works to be Undertaken

1.2.1 This OSMP is informed by the proposed works set out in **Chapter 2: Proposed Development** (**Document Ref: 6.2 ES Vol.1, 6.2.2**), the **CEMP** (**Document Ref: 6.3 ES Vol.2, 6.3.7**), and the **Decommissioning Environmental Management Plan (DEMP) (Document Ref: 6.3 ES Vol.2, 6.2.8**).

1.2.2 The element-specific infrastructure located within the Solar Array Area, Cable Route Corridor, and Bespoke Access Corridor are summarised below. Also listed are the main works involving soil disturbance that will occur during each phase of the Proposed Development.

Solar Array Area

1.2.3 Within the Solar Array Area, the Proposed Development will comprise of the following:

- Solar arrays – each panel will be up to 2.5 m x 1.5 m.
- Supporting infrastructure – inverters, combiner boxes, and transformers.
- Battery Energy Storage System (BESS).
- Onsite substation compound – up to 250 m x 160 m or 200 m x 200 m.
- Onsite cabling – to be placed underground where possible.
- Fencing.
- Temporary construction compounds and roadways.
- Earthworks to form suitable development platform for the substation and BESS.
- Water supply and drainage infrastructure including up to four firewater storage tanks with a total capacity of 240 m3.

- Landscaping and biodiversity enhancement areas around Solar Array Area perimeter.
- Areas of reinforced ground or hardstanding adjoining the BESS.

1.2.4 The main workings involving soil disturbance during the construction, operational, and decommissioning phases are listed below:

Construction phase

- Piling of galvanised steel poles for mounting solar arrays.
- Soil stripping within the footprint of the transformers, BESS compound and adjoining hardstanding area, substation compound, temporary construction compounds and roadways, and firewater tanks. Stripped soils are to be stored or transported to other parts of the site for reuse.
- Soil reinstatement and earthworks to form development platform for substation and BESS, and landscaping around Solar Array Area perimeter.
- Laying of onsite cables using trenched methods and trenchless methods such as horizontal direct drilling where required.
- Fencing around site perimeter.
- Installation of water supply and drainage infrastructure.

Operational phase

- Vehicle access for maintenance work to solar arrays and associated infrastructure.
- Vehicle access associated with the land management strategy. This may include mowing vegetation or activities associated with grazing.
- Soil storage to enable restoration of areas of hard development to agricultural land post-decommissioning. The locations of long-term soil storage areas within the Order Limits will be set out in a detailed SMP.

Decommissioning

- Removal of all solar infrastructure.
- Removal of access tracks.
- Reinstating stockpiled soils on areas of non-permanent hard development.
- Repairing of any damage to agricultural drains.

Cable Route Corridor

1.2.5 Within the Cable Route Corridor, the Proposed Development will include the following:

- Cable route connection between Solar Array Area and Bicker Fen substation.
- Extension of Bicker Fen substation and establishment of new bay for connection to the National Grid network (if not previously constructed as part of the Heckington Fen draft DCO).
- Temporary construction compounds located at 1-3 km intervals within the Cable Route Corridor, along with temporary roadways to enable access to all land.
- Reinstatement planting around the Cable Route Corridor perimeter.

1.2.6 The main workings involving soil disturbance during the construction period are listed below:

Construction phase

- Laying of cable between Solar Array Area and Bicker Fen substation through trenched methods, and trenchless methods such as horizontal direct drilling where required (e.g. crossing existing features).
- Soil stripping within footprint of temporary construction compounds, and Bicker Fen substation extension area. Transport of stripped soils to storage areas. All temporary roadways are existing tracks and do not require soil disturbance.

Operational phase

- There will be no disturbance to soils within the Cable Route Corridor during the operational phase.

Decommissioning phase

- The cable will be left in situ therefore there will be no further disturbance to soils within the Cable Route Corridor during decommissioning.

Bespoke Access Corridor

1.2.7 Within the Bespoke Access Corridor, the Proposed Development will comprise of the following:

- Access road to facilitate construction of the Solar Array Area via the A17.
- Drainage ditches and road verges either side of the access road.
- Reinstatement planting around the Bespoke Access Corridor perimeter.

1.2.8 The main workings involving soil disturbance during the construction period are listed below:

Construction phase

- Soil stripping within the footprint of the main access road and construction and maintenance tracks.
- Excavation of drainage ditches and earthworks for verges on either side of the access road.

Operational phase

- Soil storage to enable restoration of Access Road to agricultural land post-decommissioning. The locations of long-term soil storage areas within the Order Limits will be set out in a detailed SMP.
- The Access Road will remain in place for the operational phase therefore there will be no further soil disturbance during this phase.

Decommissioning phase

1.2.9 It is currently proposed that the access road will be removed upon completion of decommissioning work and the land returned to the baseline soil profile condition. Soil disturbance will be similar to the construction phase and will involve reinstating the baseline soil profile conditions to restore the area to agricultural use post-decommissioning.

Baseline Conditions

1.2.10 The majority of the land within the Site, comprised of the Solar Array Area, the Cable Route Corridor, and the Bespoke Access Corridor, is managed for arable agriculture.

1.2.11 Natural England Provisional ALC data indicates the Site includes areas of Grade 1, Grade 2, and Grade 3 quality agricultural land. The Solar Array Area and Bespoke Access Corridor are confined to areas of provisional Grade 3. The Cable Route Corridor is predominantly provisional Grade 2 (80%) land with smaller portions of provisional Grade 1 (15%) and provisional Grade 3 (5%).

1.2.12 SSEW soil association mapping indicates that three soil associations are found within the Site; Ruskington (512c), Beccles 3 (711t), and Wallasea 2 (813g). These soils can be summarised as follows:

- Beccles 3 (711t) – Heavy textured Clay and Heavy Clay Loam topsoils over slowly permeable Clay/Heavy Clay loam subsoils
- Wallasea 2 (813g) – Heavy textured Silty Clay and Clay topsoils over slowly permeable Silty Clay subsoils
- Ruskington (512c) – Sandy loam/Sandy Clay Loam topsoils (Some Clay/Heavy Clay Loam topsoils in parts – Ickford soils) over sandy Loam, loamy sand/sand subsoils (occurrences of slowly permeable clay lower subsoils in parts)

1.2.13 The details of the baseline soil profile conditions required for any soil reinstatement will be obtained from the detailed soil surveys to be undertaken pre-construction. The data required for the reinstatement will include soil type, soil horizon depth and order, soil structure and stone content.

1.2.14 A more detailed breakdown of the baseline soil conditions for each element of the Proposed Development is provided below.

Solar Array Area

1.2.15 The baseline for the Solar Array Area is informed by a detailed ALC survey conducted by WA in August and September 2023. The survey data provides a description of agricultural land quality and soil resources within the Solar Array Area and are used within the OSMP to identify the best practice measures and processes required to safeguard the soil and land resources from loss, damage, or disruption as a result of the Proposed Development. The results are presented in a standalone ALC report **(Document Ref: 6.3 ES Vol.2, 6.3.93)** and are summarised below.

1.2.16 The survey confirmed the provisional grading, showing the Solar Array Area predominantly consisted of mixture of Subgrade 3b (49.5%) and Subgrade 3a (44.6%) agricultural land. Subgrade 3b land occupied most of the land in the north-west and central parts of the Solar Array Area. The Subgrade 3a land was predominantly found in the north-eastern and southern parts of the Solar Array Area. Isolated pockets of Grade 2 quality land (2.8%) were seen within the areas of Subgrade 3a land. The remaining land was classed as being non-agricultural.

1.2.17 The properties relevant to protecting the soil resource through the implementation of this OSMP are summarised below for each of the three soil associations found within the Site.

1.2.18 The detailed ALC survey report found the soil profiles within the Solar Array Area were consistent with the description of the soil associations shown in the SSEW mapping; Ruskington (512c), Beccles 3 (711t), and Wallasea 2 (813g).

1.2.19 Areas with characteristics of the Ruskington (512c) soil association had a very dark greyish brown sandy loam or sandy clay loam topsoil ranging in depth from 26 cm to 45 cm. Some points identified as Ruskington (512c) soils had characteristics associated with the Ickford soil series, where the topsoil had a heavy clay loam to clay texture. The topsoil can be differentiated from the underlying subsoil by colour and texture; the upper subsoil had a yellowish-brown colour and a lighter texture (sandy loam or loamy sand).

1.2.20 Soils with characteristics of the Beccles 3 (711t) association had a heavy clay loam or clay topsoil ranging in depth from 20-50 cm, overlying clay subsoils. The dark greyish brown topsoil can be differentiated according to colour from the underlying lighter coloured upper subsoil and pale greyish lower subsoil layers.

1.2.21 Soils with Wallasea 2 (813g) characteristics were found in the eastern part of the Solar Array Area. Topsoils ranged in depth from 30 cm to 45 cm and were of a silty clay to clay texture and had a dark greyish brown colour. The underlying subsoil was of a silty clay texture and can be differentiated from the topsoil by its dark grey colour.

1.2.22 The texture of these three soil types, that is the relative proportions of sand, silt, clay, and organic matter content, is a particularly important determinant of their susceptibility to compaction and erosion during construction. The heavy textured clayey soils within the Solar Array Area are less prone to water erosion, but care is required when handling to avoid structural damage. Conversely, the lighter textured, sandy soils are susceptible to being lost through erosion, but are more resilient to structural damage and are more easily remediated if structural damage does occur.

1.2.23 The spatial distribution of surveyed soil profiles matching description of the above soil associations within the Solar Array Area is displayed in Drawing ST19595-168 **(Document Ref: 6.3 ES Vol.3, 6.4.74)**.

Cable Route Corridor

1.2.24 Detailed ALC and soil survey data for the Cable Route Corridor were not available at the time of writing this OSMP and the associated ES chapter (**Document Ref: 6.2 ES Vol.1, 6.2.14**). Therefore, the baseline for agricultural land quality and soil resources within the Cable Route Corridor is informed by Natural England (NE) provisional ALC data, Soil Survey of England and Wales (SSEW) soil association maps, and Cranfield University data for this OSMP.

1.2.25 A soil survey of the Cable Route Corridor will be carried out pre-construction to provide soil data for the baseline soil profile conditions to inform the detailed SMP.

1.2.26 Provisional ALC data indicate that the Cable Route Corridor is predominantly comprised of Grade 2 agricultural land (80%), with portions of Grade 1 (15%) and Grade 3 (5%) agricultural land. Assuming an approximately 50:50 split between Subgrades 3a and 3b, as was seen within the Solar Array Area, 97.5% of the Cable Route Corridor is comprised of BMV land and the remaining 2.5% is non-BMV.

1.2.27 SSEW mapping indicates that the soil associations observed within the Solar Array Area also occur within the Cable Route Corridor. Site-specific baseline information for the soil resources within the Cable Route Corridor can be obtained by cross-referencing the soil associations within the Cable Route Corridor with the three main soil types identified in the detailed survey of the Solar Array Area. These soil types were consistent with the characteristics of the three soil associations detailed above and will be similar throughout the Site.

1.2.28 The cable route predominantly consists of Wallasea 2 (813g) soils and Beccles 3 (711t) soils (63% and 31%, respectively). Both of these soil associations are characterised by heavy textured topsoils overlying slowly permeable silty clay or clay subsoils. The topsoils are dark greyish brown in colour overlying greyish subsoils.

1.2.29 SSEW mapping indicate the presence of smaller amounts of Ruskington (512c) soils within the northern part of the Cable Route Corridor (6%), and Agney (812c) soils within the eastern part (0.1%).

1.2.30 Ruskington soils are characterized by a sandy loam or sandy clay loam topsoil, over sandy loam, loamy sand or sand subsoils. This association is characterised by a dark greyish brown topsoil overlying yellowish brown coloured subsoil.

1.2.31 Agney soils have a silt loam topsoil overlying silt loam or fine sandy silt loam calcareous subsoils. Soils of this association have a dark greyish brown coloured topsoil overlying greyish brown or brown upper subsoils.

Bespoke Access Corridor

1.2.32 A detailed ALC survey of the Bespoke Access Corridor was carried out in September 2024 by WA. The results are presented in detail in a standalone ALC report (**Document Ref: 6.3 ES Vol.2, 6.3.94**).

1.2.33 The ALC survey found that the Bespoke Access Corridor primarily consists of Subgrade 3a (48.6%) and Grade 2 (36.6%) quality agricultural land with smaller amounts of Subgrade 3b quality agricultural land (13.6%) also present. The remainder of the area was non-agricultural land (1%) with a small area not surveyed (0.2%).

1.2.34 The soils recorded during the survey were consistent with the characteristics of the Beccles 3 (711t) and Ruskington (512c) soil associations identified within SSEW mapping as occurring within this area.

1.2.35 Beccles 3 (711t) soils are characterised by heavy textured topsoils overlying slowly permeable clay subsoils. The dark greyish brown topsoil can be differentiated according to colour from the underlying lighter coloured upper subsoil and pale greyish lower subsoil layers.

1.2.36 Ruskington soils are characterized by a sandy loam or sandy clay loam topsoil, over sandy loam, loamy sand or sand subsoils. This association is characterised by a dark greyish brown topsoil overlying yellowish brown coloured subsoil.

1.2.37 The spatial distribution of surveyed soil profiles matching description of the above soil associations within the Bespoke Access Corridor is displayed in Drawing ST19595-385 **(Document Ref: 6.3 ES Vol.3, 6.4.76)**.

Soil Chemical Characteristics

1.2.38 Topsoil and subsoil samples collected during the surveys of the Solar Array Area and Bespoke Access Corridor were analysed for their pH, organic matter (OM) content (loss on ignition), and the plant available concentrations of three key nutrients; potassium (K), phosphorus (P) and Magnesium (Mg).

1.2.39 The chemical characteristics measured exert a strong influence on plant growth. These results can be used to inform on a seed mix and any fertiliser requirements to establish a pre-construction vegetation cover which will protect soil resources from loss and structural damage, and which is appropriate for the intended land use during the operational phase.

1.2.40 The analysis results are presented in Tables 1 and 2, and summarised below as the averages for each of the three soil types occurring within the Solar Array Area and Bespoke Access Corridor.

Solar Array Area

1.2.41 Using the Defra index scale, concentrations of plant available K can be defined as Moderate for soils displaying characteristics of the Beccles 3 (711t), Ruskington (512c) and Wallasea 2 (813g) soil associations (Defra indices of 2-, 2-, and 2+, respectively). Upper subsoil K concentrations were Low (1) for Beccles 3 (711t) and Ruskington (512c) soils, and Moderate (2-) for Wallasea 2 (813g) soils.

1.2.42 Plant available P concentrations were Very Low (0) for Beccles 3 (711t) and Wallasea 2 (813g) associations topsoils and upper subsoil. Ruskington (512c) soils had Low (1) topsoil and Very Low (0) subsoil P concentrations.

1.2.43 Soils of the Beccles 3 (711t) association had Low (1) topsoil Mg concentrations and Very High (4) subsoil concentrations. For the Ruskington (512c) soils, topsoil Mg was High (3) whereas subsoil Mg was Moderate (2). Wallasea 2 (813g) soils had Very High topsoil (5) and subsoil (6) Mg concentrations.

1.2.44 Topsoil pH was highest in Wallasea 2 (813g) and Beccles 3 (711t) association soils, averaging 7.8 for both. In comparison, Ruskington (512c) topsoils were lower at 7.5. The upper subsoil pH varied from 7.8 for Wallasea 2 (813g) soils, 7.9 for Ruskington (512c) soils and 8.0 for Beccles soils.

1.2.45 Topsoil OM content was highest in soils of the Wallasea 2 (813g) association at 8%. In comparison, Ruskington (512c) and Beccles 3 (711t) topsoils had OM contents of 7.2 and 6.0%, respectively.

1.2.46 Average values of upper subsoil OM content varied from 2.6% for Ruskington (512c) soils to 3.7% for Beccles 3 (711t) soils and 8% for Wallasea 2 (813g) soils.

Table 1: Chemical Characteristics of Topsoil and Subsoil within the Solar Array Area

SOIL ASSOCIATION	CHARACTERISTIC	UNITS	AVERAGE	MIN	MAX
Beccles 3 (711t)	***Topsoil***				
	P	mg/l	8.6	4.9	23.5
	K	mg/l	172.2	56.0	334.7
	Mg	mg/l	43.8	150.5	507.3
	pH	-	7.8	6.9	8.4
	OM	% (w/w)	6.0	2.7	10.23
	Subsoil				
	P	mg/l	5.2	3.4	15.1
	K	mg/l	112.4	6.7	178.2
	Mg	mg/l	208.9	60.6	482.4
	pH	-	8.0	5.3	8.5
	OM (%)	% (w/w)	3.7	2.1	7.3
Ruskington (512c)	***Topsoil***				
	P	mg/l	10.4	4.6	28.3
	K	mg/l	148.3	80.6	222.8
	Mg	mg/l	157.2	43.3	366.4
	pH	-	7.5	6.8	8.2
	OM (%)	% (w/w)	7.2	3.9	11.2
	Subsoil				
	P	mg/l	7.7	3.8	14.2
	K	mg/l	61.2	18.2	95.5
	Mg	mg/l	86.3	14.3	286.8
	pH	-	7.9	6.6	8.3
	OM (%)	% (w/w)	2.6	1.7	3.8
Wallasea 2 (813 g)	***Topsoil***				
	P	mg/l	6.6	6.0	7.6
	K	mg/l	232.6	173.2	343.2
	Mg	mg/l	327.2	296.8	348.4
	pH	-	7.8	7.3	8.1
	OM (%)	% (w/w)	8	6.5	8.8
	Subsoil				
	P	mg/l	4.6	4.3	4.8
	K	mg/l	177.1	130.1	219.5
	Mg	mg/l	489.8	463.5	511.7
	pH	-	7.8	7.7	7.9
	OM (%)	% (w/w)	6.5	6.2	6.7

Bespoke Access Corridor

1.2.47 The Beccles 3 (711t) and Ruskington topsoil samples within the Bespoke Access Corridor had Very Low to Low P concentrations (index 0 to 1). Available K levels ranged from Low (1) to High (3) in the Beccles 3 (711t) topsoil samples, and from Low (1) to Moderate (2-) in the Ruskington (512c) topsoils. Available Mg was Low to Moderate (1 to 2) in the Beccles (711t) topsoils and ranged from Low (1) to High (3) in the Ruskington (711t) topsoils.

1.2.48 The pH of both soil associations was similar, ranging from 7.1 to 8.

1.2.49 Both soil associations had typical organic matter contents for arable land in an area of low rainfall and these soil types.

1.2.50 Both soil types had alkaline subsoils with pH values ranging from 7.9 to 8.5.

Table 2: Chemical Characteristics of Topsoil and Subsoil within the Bespoke Access Corridor

SOIL ASSOCIATION	CHARACTERISTIC	UNITS	AVERAGE	MIN	MAX
Beccles 3 (711t)	***Topsoil***				
	P	mg/l	76.8	3.8	9.6
	K	mg/l	56.0	119	398
	Mg	mg/l	232.8	43.2	80.3
	pH	-	7.7	7.2	7.9
	OM	% (w/w)	4.4	3.7	5.5
	Subsoil				
	P	mg/l	-	-	-
	K	mg/l	-	-	-
	Mg	mg/l	-	-	-
	pH	-	8.2	7.9	8.4
	OM (%)	% (w/w)	-	-	-
Ruskington (512c)	***Topsoil***				
	P	mg/l	7.0	2.8	12.6
	K	mg/l	124.9	92.7	162
	Mg	mg/l	61.1	37.6	108
	pH	-	7.6	7.1	8
	OM (%)	% (w/w)	3.9	3.4	4.3
	Subsoil				
	P	mg/l	-	-	-
	K	mg/l	-	-	-
	Mg	mg/l	-	-	-
	pH	-	8.3	8.0	8.5
	OM (%)	% (w/w)	-	-	-

2. Guidance on Soil Management

2.1 Introduction

2.1.1 To ensure the sustainable use of the soil resource within each element of the Proposed Development, soil management and handling activities will be informed by the following documents:

- British Society of Soil Science (2022) Working with Soil Guidance Note 3 on 'Benefitting from Soil Management in Development and Construction'
- DEFRA (2009) Code of Practice for the Sustainable Use of Soils on Construction Sites
- DEFRA (2011) Safeguarding Our Soils – A strategy for England
- MAFF (2000) Good Practice Guide for Handling Soils
- Institute of Quarrying (2021) Good Practice Guide for Handling Soils in Mineral Workings
- Institute of Environmental Management and Assessment (2022). A New Perspective on Land and Soil in Environmental Impact Assessment

2.1.2 Additionally, good practice guidance related to land management during the operational phase will be obtained from the following documents:

- BRE (2014) Agricultural Good Practice Guidance for Solar Farms
- Solar Energy UK (2022) Natural Capital Best Practice Guidance

DEFRA (2009) Code of Practice for the Sustainable Use of Soils on Construction Sites

2.1.3 DEFRA's 2009 guidance relates to construction sites and contains good practice guidance on the handling and storage of soil resources to ensure they are managed sustainably. The 2009 DEFRA guidance outlines the potential impacts on soils that may result from construction activities.

MAFF (2000) Good Practice Guide for Handling Soils

2.1.4 The MAFF (2000) guidance provides advice on good practice soil handling methods. The guide is in the form of 19 Sheets which detail a range of methods for stripping, stockpiling, handling, excavating, replacing, and decompacting soils.

Institute of Quarrying (2021) Good Practice Guide for Handling Soils in Mineral Workings

2.1.5 The aim of the Institute of Quarrying's (IoQ) 2021 guidance 'Good Practice Guide for Handling Soil in Mineral Workings' is to provide good practice advice on soil handling for the minerals sector, ensuring that impacts on soil resources and soil functions are minimised wherever possible.

2.1.6 The IoQ guidance is intended for the minerals sector and therefore is not directly transferrable to this project. However, the document includes a test for the field assessment of soil moisture content and plasticity (summarised in Tables 3 and 4) which is relevant to all projects involving soil handling. Incorporating this test into planned works helps ensure that work is not carried out on soils that are not in an appropriate condition for handling.

2.1.7 The IoQ guidance also provides a method selection process for soil stripping, handling, storage and replacement. The method selection process takes into account several site-specific variables including soil texture, moisture regime, and climate.

Institute of Environmental Management and Assessment (2022). A New Perspective on Land and Soil in Environmental Impact Assessment

2.1.8 The Institute of Environmental Management and Assessment (IEMA) issued their guidance document 'A New Perspective on Land and Soil in Environmental Impact Assessment' on 17 February 2022. Chapter 11 of this guidance document sets out priorities and processes needed to ensure that construction operations are well managed so that land and soil are protected and managed sustainably and includes guidance on the onsite and offsite reuse of soil.

BRE (2014). Agricultural Good Practice Guidance for Solar Farms

2.1.9 This document includes good practice guidance for the inclusion of agriculture within solar developments. Of relevance to this OMSP are the sections on land management during the operational phase, which covers the establishment and maintenance of an appropriate vegetation cover to prevent loss and/or damage to the soil resource.

Solar Energy UK (2022). Natural Capital Best Practice Guidance

2.1.10 The Solar Energy UK document includes guidance on incorporating measures to increase biodiversity and protect natural capital within solar developments. Of relevance to this OSMP are the sections on the establishment of a suitable vegetation cover and its maintenance during the operational phase.

3. Soil Balance and Reuse on Site

3.1 Background

3.1.1 For all three elements of the Proposed Development, the majority of the soils will be retained onsite. Where not directly reinstated to their final destination, any stripped soils will be stored appropriately onsite.

3.1.2 The areas where soils will be stripped or displaced are limited to the following areas:

Solar Array Area

- Transformer bases (**Work No. 2 - Document Ref: 2.4**).
- BESS compound and adjoining hardstanding area (**Work No. 2 - Document Ref: 2.4**).
- Substation compound (**Work No. 3 - Document Ref: 2.4**).
- Temporary construction compounds and roadways (**Work No. 7- Document Ref: 2.4**).
- Trenches for onsite cabling (**Work No 6- Document Ref: 2.4)**.
- Trenches for water supply and drainage infrastructure (**Work No. 7- Document Ref: 2.4**).

Cable Route Corridor

- Trench for cable between Solar Array Area and Bicker Fen substation (**Work No. 4A** - **Document Ref: 2.4**).
- Temporary construction compounds and roadways (**Work No. 4B- Document Ref: 2.4**).
- Bicker Fen substation extension area (**Work No. 5- Document Ref: 2.4**).

Bespoke Access Corridor

- Main access road (**Work No. 8- Document Ref: 2.4).**
- Drainage ditches and verges (**Work No. 8- Document Ref: 2.4**).
- Construction and maintenance tracks (**Work No 8- Document Ref: 2.4**).

3.2 Soil Volume Balance

3.2.1 A soil balance identifies if there is any surplus or deficit of soil within a Site plan and includes the total quantities of topsoil and subsoil. Where possible, all soil resources (topsoil and subsoil) will be retained onsite for reuse. This will often save money and time in having to source soil elsewhere or pay for disposal offsite (which requires an environmental permit).

3.2.2 A soil volume balance for each element of the Proposed Development will be included within a detailed SMP once a finalised plan and cut and fill details are available for the Site, and any additional soil resource surveys have been completed for the Cable Route Corridor.

3.2.3 The priority will be to ensure that where possible surplus topsoil and subsoil will be retained onsite for use in any planned restoration.

3.2.4 It is proposed that at the detailed design stage, a cut and fill balance will be ensured across the entire Order Limits.

3.3 Soil Storage Locations

3.3.1 Where possible, soils will be moved directly from the donor site to the receptor site without the need for storage. At present, the intention is to ensure a cut and fill balance during the detailed design phase of the project which would avoid soil storage. If soil storage is necessary, appropriate soil storage locations within the Order Limits will be identified prior to stripping and set out in a detailed SMP.

3.3.2 The location of any soil storage will ensure that soil handling and movement is kept to a minimum. Soil storage areas will be on level to gently sloping land and located away from any water courses, drains and areas at risk of flooding.

3.3.3 Soil storage locations will also be considered with regard to the length of time the soils are expected to be stockpiled, ensuring they will not have to be moved or disturbed to support later stages of the development.

3.3.4 Soils stored in bunds for more than six months will be seeded with an appropriate low maintenance grass/clover mixture. This will reduce soil erosion and prevent colonisation of bunds by weeds and promote soil health. To enable a vegetation cover to be established on long-term subsoil bunds, it may be appropriate to cover the bund with stripped topsoil to the natural depth determined in a detailed soil survey.

3.3.5 The Environment Agency will be consulted where soils are stockpiled for longer than one year as materials in storage for periods longer than 1 year may be considered as waste.

3.3.6 The bund vegetation cover is to be managed (by spraying, mowing, or stripping as appropriate and as defined in a detailed SMP produced pre-construction) to prevent the spread of seeds from the bund onto adjacent land.

3.3.7 The condition of the bunds will be regularly monitored. If rainwater gathers on the bund surfaces or in areas directly adjacent to them, drainage pathways to soakaway(s) away from the bund will be provided. Soil bunds will be stable structures with side slopes between 25-45 degrees.

3.3.8 Topsoil and subsoil must be stripped and stored separately to avoid the loss of soil resources through mixing. Topsoils may be stored on top of topsoil or subsoil, but subsoils will only be stored on top of subsoils. Therefore, topsoil will be stripped from the soil storage area prior to the creation of any bunds.

3.3.9 To avoid causing structural damage to the soil resource during storage, soil bunds will be no more than 3 m high for topsoil and 5 m high for subsoil.

3.3.10 Bunded soils will not be unnecessarily trafficked to avoid causing compaction or damage to the soil structure. Vehicle movements will be restricted to dedicated haulage routes, the locations of which will be set out within a detailed SMP.

3.4 Soil Handling and Storage Monitoring Protocol

3.4.1 The appointed Principal Contractor for the Proposed Development will be responsible for implementing the detailed SMP.

3.4.2 An Agricultural Liaison Officer (ALO) will be appointed to monitor the implementation of the detailed SMP for works involving soil handling and storage within the Bespoke Access Corridor and the Cable Route Corridor. They will be supported by a Soil Scientist to monitor the key tasks as detailed in Table 3, below. The ALO will be a point of contact between the landowners and the Principal Contractor to deal with questions regarding how works may be affecting their day-to-day farming operations.

3.4.3 Records of all works involving soil handling and storage will be kept by Site contractors and a Soil Scientist during the construction phase for reference and auditing purposes.

3.4.4 A summary of the record keeping and monitoring requirements is provided below in Table 3.

Table 3: Record keeping and monitoring during the construction phase

ITEM	WHAT TO LOOK FOR	RESPONSIBILITY	FREQUENCY
Soil Stockpiles	Erosion rills, water ponding, loss of protective cover.	Contractor	Once a month and after rainfall exceeding 10 mm in 24 h.
Soil handling	Conformance with the detailed Soil Management Plan (SMP), record operations undertaken, weather and soil conditions, any problems and corrective actions undertaken.	Contractor	Daily when operations including or impacting soils are undertaken.
	Conformance with the detailed SMP, check daily record.	Contractor	
Ongoing monitoring of SMP implementation	Verification of soil works on Site and soil stockpiles to measures outlined in detailed SMP.	Soil Scientist / ALO (supported by a Soil Scientist)	At key stages of site works, approximately monthly.
Verification of the restored agricultural land to the baseline soil profile conditions	Has the soil profile been restored as much as practicable to do so?	Soil Scientist / ALO (supported by a Soil Scientist)	Once, after reinstatement, re-inspected after remediation (if applicable).
Aftercare reports	Significant differences in plant performance, compaction and waterlogging between the restored and undisturbed land.	Soil Scientist / ALO (supported by a Soil Scientist)	Annually until unrestricted.

4. General Principles of Soil Handling

4.1.1 This section sets out good practice soil handling measures which apply to all elements of the Proposed Development: the Solar Array Area, Cable Route Corridor, and Bespoke Access Corridor.

4.1.2 The main threats to soil resources on construction sites are trafficking of vehicles/plant and incorrect handling resulting in damage to soil structure through compaction and smearing (both effects are referred to as deformation). These effects compromise the ability of the soil to perform its functions, such as providing adequate amounts of water, air, and nutrients to plant roots, and thus its suitability for reuse within the site without costly and time-consuming remediation.

4.1.3 The risk of compaction and smearing increases with soil wetness. Susceptibility to structural damage during construction is also determined by soil texture; clay-rich (heavy textured) soils are prone to structural damage if not handled in appropriate conditions and are more difficult to remediate if structural damage does occur, relative to sandier soils.

4.1.4 Given that the soils across each element of the Proposed Development predominantly consist of medium to heavy textured clay soils, there is a high risk throughout the Site of causing structural damage to the soil resource.

4.1.5 To minimise the risk of damage to soil structure, the following rules will be observed during all soil handling tasks:

- No trafficking/driving of vehicles/plant or materials storage to occur outside designated areas.
- No trafficking/driving of vehicles/plant on reinstated soil (topsoil or subsoil).
- Only direct movement of soil from donor to receptor areas (no triple handling and/or ad hoc storage).
- No soil handling to be carried out when the soil moisture content is above the lower plastic limit (where the soil is plastic, see Tables 4 and 5 below).
- Soil handling must take account of prevailing weather conditions (see rainfall "stop" criteria in Section 5.1).
- It is proposed that, where possible, the work is phased so that construction elements involving soil trafficking, stripping, handling and formation of stockpiles is avoided during periods of the year where the soils are most likely to be in a wet state (December to March).
- The formation of long-term soil storage bunds will only occur between March and October to ensure that a vegetation cover can be established.
- Plant and machinery will only be used when ground or soil surface conditions enable their maximum operating efficiency.
- All plant and machinery will always be maintained in a safe and efficient working condition.
- Low ground pressure (LGP) models or tracked vehicles will be used. This will greatly minimise the extent of compaction and/or intensity of the soil loosening required during site restoration. Consequently, it will reduce the costs and potential delays due to the need for additional soil cultivation.
- Daily records of operations will be kept, and Site and soil conditions will be maintained (see Section 3.4 for the summary of monitoring and record keeping schedule).

4.1.6 Soil mixing also poses a risk to the soil resource and its potential for reuse on Site due to reduced fertility. The separately identifiable topsoils and subsoils encountered (and stripped for storage) are to be stored separately in stockpiles to avoid loss of soil resources through mixing. Soil will only be stored in designated soil storage areas and must be kept free of contamination.

4.1.7 Dependant on the depth of stripping and excavation, there will be a volume of topsoil available for reuse. It is proposed that topsoil is replaced to a depth no greater than 300 mm, unless a specific plan is proposed that ensures that the proposed end usage is suitable.

5. Stop Conditions

5.1 Adverse Weather

5.1.1 In certain weather conditions, the handling of soils must be effectively managed to prevent damage. The following criteria must be applied during operation to determine if conditions are suitable for topsoil and subsoil handling:

- In drizzle and/or intermittent light rain, handling can continue for up to four hours or until the soils enter a plastic state at which point operation must cease (see Tables 4 and 5, testing for soil moisture state and plasticity);
- If there is heavy rain (e.g. heavy showers, slow moving depressions), handling must stop immediately;
- If there is sustained heavy rainfall of more than 10 mm in 24 hours, soil handling must be suspended and not restarted until the ground has had at least a full day to dry, or an agreed soil moisture limit can be met; and
- Soil shall not be handled or trafficked over/driven on immediately after heavy rainfall (or snow/hail) in a waterlogged condition, or when there are standing pools of water on the soil surface.

5.1.2 If the works are interrupted by a rainfall event, soil stripping will be suspended, and where the soil profile has already been disturbed, the works will be completed to the base level in that location.

5.1.3 Before recommencing work, soil moisture content must be tested, as described in Tables 4 and 5. Work can only recommence if the soil moisture is below the lower plastic limit. The weather forecast must also be checked and works only recommenced if there is no rain forecast for at least a day, regardless of soil moisture condition.

5.1.4 Additionally, soil will not be handled or trafficked over/driven on when the ground is frozen or covered by snow.

5.1.5 The above criteria must be clearly understood by all personnel.

5.2 Soil Conditions

5.2.1 Irrespective of the weather, soils will not be handled when in a plastic state (when moisture content causes soils to exceed their lower plastic limit), and as a rule, they will be dry when handled. The methodology for determining whether soils have a suitable moisture content for handling is described below in Tables 4 and 5.

5.2.2 If soils are excavated and placed in stockpiles when wet (above the plastic limit), they can be over-compacted by the machinery handling them, or by the weight of the soil above them in the stockpile. As well as this structural damage, compacting soils within a stockpile leads to the core of the stockpile remaining anaerobic throughout the storage period. This results in the soil being difficult to handle and re-spread at the time of reinstatement (i.e. it will not be in a friable state and will not break down into a suitable tilth). If compaction during storage does occur, a period of drying and appropriate cultivation is required (to repair soil structure and re-aerate the soil) to ensure the soil is acceptable for planting. The costs of these unplanned operations, and consequent delays to the programme of works could be substantially greater than the costs of ensuring that the soil stripping and stockpiling operations are carried out in optimum conditions and making allowances for delays due to bad weather.

5.2.3 Stockpiles will be monitored to ensure there are no environmental impacts, such as erosion and discharges of sediment laden water from the stockpiles to drainage ditches and other watercourses.

5.3 Field Testing of Soil Conditions

5.3.1 The following sections detail a two-stage methodology for the field assessment of soil plasticity and suitability for handling. The method is comprised of a moisture state test and a consistency test and has been recognised by Natural England as an acceptable and valid approach as it is considered to be less open to interpretation and easier to conduct than use of consistency testing (Table 5) alone.

5.3.2 At least five points per area to be worked on a given day will be sampled (a minimum of 1 point per 50 m of the length of the working area, or 2 samples per ha). The sample will be a composite of at least five subsamples from around each sample point. Samples of both topsoil and subsoil will be taken and sampled separately.

Soil moisture state

5.3.3 The samples will first be tested for soil moisture state, see methodology in Table 4.

Table 4: Testing for moisture state

TEST	HANDLING ALLOWED?
If soil sample is wet, films of water are visible on the surfaces of grains and aggregates; or If soil sample readily deforms into a cohesive 'ball' when squeezed.	Soils will not be handled.
Soil peds break up/crumble readily when squeezed in the hand. Sample does not form a cohesive ball.	Soils can be handled
If the sample is moist, i.e. there is a slight dampness when squeezed between the fingers, but it does not significantly change colour (darken) on further wetting.	No handling by dozers but may be handled by excavators if the consistency test is passed.
Sample is dry and brittle. Sample looks dry and changes colour (darkens) on wetting.	Soils can be handled if the consistency test is passed.

Consistency

5.3.4 Where required as per Table 4, samples will be further tested for consistency using the methodology in Table 5.

Table 5: Consistency testing

STEP A		
Attempt to roll sample into a ball by hand	It is impossible because the soil is too hard (dry)	Soils can be handled
	It is impossible because the soil is too loose (dry)	Soils can be handled
	It is impossible because the soil is too loose (wet)	Soils will not be handled
	It is possible to roll the sample into a ball by hand	See STEP B
STEP B		
Attempt to roll the ball into a thread of 3 mm diameter on a flat non-adhesive surface using light pressure from the flat of a hand	It is impossible as the soil crumbles or disintegrates	Soils can be handled
	It is possible to roll a 3 mm diameter thread	Soils will not be handled

6. Site-Specific Measures

6.1.1 In addition to the above general soil management measures which apply to all elements of the Proposed Development (detailed in Sections 4 and 5), the following Site-specific measures will be considered within the detailed SMP to safeguard the land and soil resources within the Solar Array Area, Cable Route Corridor, and Bespoke Access Corridor.

6.1 Solar Array Area

Agricultural Drainage

6.1.1 Land drainage within the Solar Array Area is comprised of a primary system of drainage channels and pumping stations controlled by the Internal Drainage Boards (IDBs), supplemented by secondary and tertiary agricultural drainage networks of ditches, tile drains, and mole drains established by individual landowners.

6.1.2 The main threat to agricultural drainage during the construction phase is from damage to the existing field drainage system from soil excavation and piling the PV mounting frame legs. **The Flood Risk Assessment (FRA) (Document Ref: 6.3 ES Vol.2, 6.3.81**) produced to accompany **Chapter 11: Water Resources and Flood Risk (Document Ref: 6.2 ES Vol.1, 6.2.11)** provides a description of the land drainage within the Solar Array Area and identifies the location of underdrainage. Mitigation measures have been included in a **CEMP (Document Ref: 6.3 ES Vol.2, 6.3.7)** to avoid damage to the mapped underdrainage, and where this is not practicable, field drains will be diverted or replaced or such other solution required to alleviate flooding in consultation with the landowner.

6.1.3 Structural damage to the soil resource during the construction phase can also disrupt agricultural drainage within the Solar Array Area. Sections 4 and 5 of this OSMP provide mitigation measures to reduce the risk of damage to the soil resource.

6.1.4 Agricultural field drainage systems require regular maintenance to remain effective, which will not be possible within the Solar Array Area during the operational phase. As part of **Chapter 11: Water Resources and Flood Risk (Document Ref: 6.2 ES Vol.1, 6.2.11)**. The **FRA (Document Ref: 6.3 ES Vol.2, 6.3.81)** sets out a drainage strategy for the Site which will incorporate Sustainable Drainage Systems (SuDS) where feasible. These mitigation measures will alleviate impacts on agricultural drainage within the Solar Array Area during the operational phase.

6.1.5 Impacts on agricultural drainage during the decommissioning phase will be similar to those of the construction phase. Therefore, the same mitigation measures relating to good soil handling practices will be followed. A suitable drainage system will be established as part of the decommissioning programme to enable the land to be returned to arable agriculture and its pre-construction productivity.

Land Management

6.1.6 A strategy for land management within the Solar Array Area is described in the **outline Landscape and Ecological Management Plan (LEMP) (Document**

Ref: 6.3 ES Vol. 2, 6.3.19) for the Site. This includes a planting plan for the site and measures for maintaining the target vegetation for the operational period.

6.1.7 As part of this strategy, the arable land within the Solar Array Area will be sown with a grass seed mix to establish grassland on the area beneath and surrounding the PV panels. The grass seed mix will be left for as long as practicable to establish prior to the construction phase. For slower growing grass mixtures, the Solar Energy UK (2022) guidance recommend this is done during the year before construction as fine grass species can take up to a year to fully establish. A well-established vegetation cover will mitigate against erosion and structural damage to the soil resource and provide a stable base for construction. The grassland will be mowed or grazed to prevent slower growing grass species from being smothered by faster growing weeds. Management will involve annual management of weeds.

6.1.8 If any adverse damage is done to the soils or vegetation during construction, this will be ameliorated to ensure the vegetation cover can be sustained for the operational phase (up to 40 years) and prevent the establishment of weeds which would impact upon the surrounding agricultural land as well as the Site itself when converted back to agricultural use following decommissioning. Maintaining an active vegetation cover during the operational phase will reduce the risk of soil erosion as well as protect and promote soil quality.

6.1.9 At the time of writing this OSMP, it has not been confirmed whether the Solar Array Area will continue to be in agricultural use during the operational phase through sheep grazing. If grazing is proposed at a later stage of the application, this OSMP will be amended with additional guidance from the BRE (2014)7 and Solar Energy UK (2022)[8] documents which include advice on the inclusion of grazing in the operational phase management of solar farms.

6.2 Cable Route Corridor

Agricultural Drainage

6.2.1 Details on the existing land drainage network within the Cable Route Corridor were not available at the time of writing. Given that the land use is consistent throughout the Site, the **FRA (Document Ref: 6.3 ES Vol.2, 6.3.81)** assumes a similar drainage system to the Solar Array Area, consisting of primary pumped drainage channels as well as secondary and tertiary agricultural field drains. The Applicant will liaise with landowners to collect information on the current drainage system throughout the Order Limits pre-construction.

6.2.2 The main threat to agricultural drainage during the construction phase is from damage to the existing field drainage system during soil excavation as the cable will be buried to a depth beyond that of most agricultural drains. Mitigation measures are to be included in a CEMP **(Document Ref: 6.3 ES Vol.2, 6.3.7)** to avoid damage to the mapped underdrainage, and where this is not practicable, field drains will be diverted, replaced, or such other solution required to alleviate flooding in consultation with the landowner.

6.2.3 Therefore, the mitigation measures included within the **CEMP (Document Ref: 6.3 ES Vol.2, 6.3.7)** will apply to the Cable Route Corridor during the construction phase to avoid disrupting agricultural drainage. Where required, temporary drainage will be installed to intercept existing field drains. All intercepted field drains will be diverted by purpose-built connectors into the pre-construction drainage system and restored as part of the post construction restoration.

6.2.4 In areas running alongside the trench line, temporary cut-off drains may be installed to prevent surface water reaching the trench.

6.2.5 Land within the Cable Route Corridor will be returned to the baseline soil profile conditions during the operational phase and the cable will be left in situ during decommissioning. Therefore, agricultural drainage within the Cable Route Corridor will not be affected further beyond the construction phase.

6.3 Bespoke Access Corridor

Agricultural Drainage

6.3.1 Details on the existing land drainage network have been obtained for parts of the Bespoke Access Corridor and will be considered in the design of the Access Road at the detailed design stage. The Applicant will liaise with landowners pre-construction to collect information on the drainage network throughout the remaining areas of the Bespoke Access Corridor. Given that the land use is consistent throughout the Site, it is assumed that the drainage system is also consistent through out the Bespoke Access Corridor, consisting of primary pumped drainage channels and secondary agricultural field drains.

6.3.2 The main threat to agricultural drainage within the Bespoke Access Corridor occurs during the construction phase. The potential impacts of the access route construction on agricultural drainage are similar to those arising from soil handling activities within the Solar Array Area and Cable Route Corridor. The good practice guidance set out in Sections 4 and 5 will therefore be followed for the Bespoke Access Corridor. Mitigation measures are to be included in a **CEMP (Document Ref: 6.3 ES Vol.2, 6.3.7)** to avoid damage to the mapped underdrainage, and where this is not practicable, field drains will be diverted, replaced, or such other solution required to alleviate flooding in consultation with the landowner.

7. Outline Soil Management Methodology

7.1 Site Preparation

The following Site preparation methodologies apply to the Solar Array Area, Cable Route Corridor, and Bespoke Access Corridor, unless otherwise stated.

7.1.1 Following harvesting of the final crop, the Solar Array Area and access track corridor will be sown with a grass seed mixture to establish a vegetation cover which will protect the soil resource and provide a stable working surface during the construction phase. The seed mix will be left for as long as practicable to establish a vegetation cover ahead of the commencement of construction.

7.1.2 A method for establishing and maintaining the target vegetation cover is set out in the **LEMP (Document Ref: 6.3 ES Vol. 2, 6.3.19)**. Further guidance on managing an effective vegetation cover on solar developments is provided in the BRE (2014) and Solar Energy UK (2022) guidance documents. These describe methods of ameliorating compaction and reseeding areas between solar panels using standard agricultural machinery. The fertility and pH of the soil is a key factor in determining the success of establishing a grass sward. The soil chemical analysis results set out in Table 1 of this OSMP can be used to assess soil fertiliser and lime requirements to optimise the growth of the target vegetation cover.

7.1.3 Prior to construction, marking and signposting of the undisturbed areas (where no construction activities or vehicle trafficking over/driving on occurs) is required and will be detailed in the Contractor method statements (to be prepared by the Contractor). Any trees, hedgerows or valuable habitats which are to be retained will be marked out with barrier tape; and subsequently protected and managed.

7.1.4 Any underground services crossing areas of soil stripping, soil excavation, or piling are to be surveyed and their depth and position are to be clearly marked to ensure they are not impacted by construction. This assessment will also include any field drains to avoid disruption to agricultural drainage resulting from construction. After stripping or excavation, to ensure the integrity of service infrastructure is maintained, the service location may require fencing off, or if the area over services are to be trafficked, additional protection or mitigation may be required.

7.1.5 To reduce the likelihood of anaerobic conditions developing within the topsoil stockpile, prior to commencement of soil stripping or excavation, the topsoil surface will only have short surface vegetation. To achieve short surface vegetation, the area will be mown or trimmed, where required. Cuttings will be disposed of off-site to a suitably licenced facility with reuse and recycling favoured over disposal (e.g., recycling via a local composting facility). Cuttings must not be added to or mixed with the stripped soil, as the presence of excessive amounts of plant material in the stockpile will be detrimental to its quality due to its decomposition (rotting) in anaerobic conditions. Alternatively, the vegetation may be killed off by application of an approved and suitable non-residual herbicide no less than two weeks prior to commencement of soil stripping operations at the location.

7.2 Soil Stripping

The following guidance applies to all areas within the Solar Array Area, Cable Route Corridor, and Bespoke Access Corridor where soils are to be stripped.

7.2.1 Topsoil can be stored on either topsoil (of the same type) or on subsoil. Subsoil can ONLY be stored on subsoil. Therefore, the topsoil must be stripped from subsoil storage areas in advance of subsoil stripping.

7.2.2 The stripping method will follow one of the appropriate methods described in the MAFF 'Good Practice Guide for Handling Soils'. Reference will also be made to DEFRA's 'Code of Practice for the Sustainable Use of Soils on Construction Sites', Annex F 'Soil Handling for Restoration to Agriculture, Ecology and Land Design' of the 2022 IEMA guidance, and the IoQ (2021) Good Practice Guide for Handling Soil in Mineral Workings.

7.3 Creation of Stockpiles

The following guidance applies to all areas within the Solar Array Area, Cable Route Corridor, and Bespoke Access Corridor where displaced soils are to be stored.

7.3.1 Correct storage/stockpiling will maintain soil quality and minimise damage to soil structure and soil biota. This ensures that the soil will readily recover once re-spread, promoting timely and effective restoration. Stockpiled soil must not be vulnerable to compaction or erosion, must not cause pollution to surrounding watercourses, and must not increase flood risk to the surrounding area.

7.3.2 The locations of soil stockpiles within the Order Limits will be set out in a detailed SMP produced pre-construction.

7.3.3 A good practice guide for the formation of stockpiles using excavators and dump trucks is provided in Sheet 2 of the MAFF guidance.

7.3.4 Potential soil compaction, erosion, and water pollution can be minimised through several good practice measures, as set out in Section 4 (General Principles of Soil Handling) and Section 5 (Stop Conditions).

7.3.5 The formation of long-term soil storage bunds will only occur between March and October to ensure that a vegetation cover can be established.

7.4 Stockpile Maintenance

The following guidance applies to all soil stockpiles within the Solar Array Area, Cable Route Corridor, and Bespoke Access Corridor.

7.4.1 Stripped soils from within the footprint of the Access Road, access tracks, BESS and substation will require storage for a period of more than six months. These stockpiles will be seeded with an appropriate low maintenance grass/clover mixture (to protect the soil against erosion, minimise soil nutrient loss, and maintain soil biological activity). Appropriate seeding will also help prevent colonisation of the stockpile by nuisance weeds that could spread seed onto adjacent land and negatively affect productivity when the land is returned to arable agriculture post-decommissioning.

7.4.2 The condition of the stockpiles will be regularly monitored. If rainwater gathers on the stockpile surface or in areas directly adjacent to them, drainage pathways to soakaway(s) away from the stockpile will be provided.

7.4.3 The locations and footprints of each stockpile will be accurately recorded on a plan of appropriate scale. Marker posts will be provided in locations which have been surveyed and recorded. The locations of stockpiles within the Order Limits will be set out in a detailed SMP.

7.4.4 The approximate volume of each stockpile will be recorded, along with details of the type of soil stored.

7.5 Drainage

The following guidance applies to all areas within the Solar Array Area, Cable Route Corridor, and Bespoke Access Corridor where soils are to be stripped.

7.5.1 Following soil stripping and excavation, where required, damaged field drains will be replaced or repaired in consultation with a local agricultural drainage contractor. Gaps shall be left between soil stockpiles where necessary to allow for surface water drainage and avoid the catchment (ponding) of water behind stockpiles. Where required, 'grips' may be dug across the working area at predetermined locations to prevent erosion and prevent ponding against stockpiles. Appropriate measures such as stone silt traps and silt fencing will be employed as required.

7.5.2 Within the Solar Array Area, Cable Route Corridor, and Bespoke Access Corridor, the measures set out in the **CEMP (Document Ref: 6.3 ES Vol.2, 6.3.7)** and **FRA (Document Ref: 6.3 ES Vol.2, 6.3.81)** will be implemented to protect agricultural drainage from disruption during the construction phase, and subsequently during the operational and decommissioning phases.

7.6 Restoration

The following general guidance applies to all areas within the Solar Array Area, Cable Route Corridor, and Bespoke Access Corridor where soils have been disturbed and restoration is required.

7.6.1 By following the measures included below, impacts on the agricultural capability of the land can be mitigated and the Site can be returned to agricultural use after decommissioning.

7.6.2 Soil reinstatement shall be subject to the same constraints of weather and soil moisture conditions as soil stripping (see Tables 4 and 5 above). All methods must adhere to the general principles set out below.

Soil decompaction

7.6.3 Where subsoil or overburden is used as the working surface during construction, subsoil decompaction will be required prior to the placement of the topsoil. The method described in Sheet 19 of the MAFF (2000) guidance using a low ground pressure bulldozer either fitted or towed with winged subsoiler tines is recommended.

7.6.4 Where the use of the decompaction methods described in the MAFF (2000) guidance is not possible, standard agricultural machinery such as tractor drawn subsoilers, aerators and harrows should be used to alleviate soil compaction between the solar panels.

Excavation of soil stockpiles

7.6.5 In some locations, for example within the Cable Route Corridor, direct excavation of the soil from the stockpiles using a long-reach back-acting/360o excavator may be possible. However, it is anticipated that the majority of soils will be transported to the reinstatement area via dump truck, and stockpile excavation is to follow the methodology described in the MAFF Good Practice Guide, Sheet 3: Excavation of Soil Storage Mounds with Excavators & Dump Trucks.

Soil Reinstatement

7.6.6 Soil reinstatement is carried out in strips in a similar manner to the stripping operations to return the soils to their baseline soil profile condition as determined by the pre-construction detailed soil surveys, or a profile specified by the Landscape Architect, to achieve the agreed planting plan. The baseline soil profile conditions include soil type, soil horizon depth and order, soil structure and stone content.

7.6.7 Soil reinstatement will follow the methodology described in the MAFF Good Practice Guide, Sheet 4: Soil Replacement with Excavators and Dump Trucks.

Decommissioning

7.6.8 All work will follow the **DEMP (Document Ref: 6.3 ES Vol.2, 6.2.8)** for the Proposed Development. The DEMP details the mitigation measures to be implemented during the decommissioning phase in order to returned to its previous land use (arable agriculture).

7.6.9 The works during the decommissioning phase include the removal of the solar PV panels and mounting structures, buried cables, the bases for the transformers, substation and BESS infrastructure, and the construction access tracks and compounds. The mitigation measures in place for the construction of these elements will also be in place for their removal during decommissioning.

7.6.10 After the removal of all project infrastructure and the reinstatement of any stripped topsoil and subsoil, a suitable cover crop to reduce bare soil exposure should be implemented prior to cultivation for the first arable crop.

7.6.11 A field drainage network will be reinstated to at least the same standard as the drainage system was prior to construction as part of the decommissioning work to allow the land to be returned to agricultural use.