Springwell Solar Farm

Outline Soil Management Plan

APFP Regulation 5(2)(q)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

EN010149/APP/7.11
November 2024
Springwell Energyfarm Ltd

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1. Introduction

1.1. Introduction and purpose

1.1.1. An Outline Soil Management Plan (oSMP) for the Proposed Development has been prepared to:

- ensure the protection and conservation of soil resources on Site;
- identify best practice measures to maintain the physical properties of the soil on Site; and
- provide measures for the management of the soil resource for Site operators.

1.1.2. This document covers measures for soil handling, soil moisture content assessments and storage and trafficking of soils during the construction, operation (including maintenance) and decommissioning phase of the Proposed Development.

1.1.3. The objective of the oSMP is to identify the importance and sensitivity of the soil resource and to provide specific guidance to ensure that there is no significant adverse effect on the soil resource as a result of the Proposed Development.

1.1.4. A Soil Management Plan (SMP) will be prepared following the appointment of the Principal contractor, prior to the start of works and in accordance with this oSMP. The measures proposed within the SMP will be agreed upon prior to the commencement of construction and decommissioning works with North Kesteven District Council.

1.1.5. This oSMP is a certified framework document pursuant to the DCO. Prior to commencement of the development, a Soil Management Plan will be submitted pursuant to Requirement 18 of the **Draft DCO [EN010149/APP/3.1]** and will be substantially in accordance with this outline version.

1.1.6. This document provides detail on the following:

- a description of the soil types and their resilience to be trafficked;
- soil handling;
- description of works and how soil damage will be minimised; and
- monitoring measures for soil condition and criteria against which compliance will be assessed.

1.2. The Proposed Development

1.2.1. The Proposed Development comprises the construction, operation (including maintenance) and decommissioning of a solar photovoltaic (PV) electricity generating facility with a total capacity in excess of 50 megawatts (MW) direct current (DC) and export connection to the National Grid. The Proposed Development will be located within the 'Order Limits'.

1.2.2. A summary of the description of the Proposed Development can be found in **Section 3.1** of the **Environmental Statement (ES) Volume 1, Chapter 3: Proposed Development Description [EN010149/APP/6.1]**. The terminology used in this document is defined in the **ES Volume 1, Chapter 00: Glossary [EN010149/APP/6.1].**

1.3. The Order Limits

1.3.1. The extent of the Order Limits are shown in **Location, Order Limits and Grid Coordinate Plans [EN010149/APP/2.1]** and the Proposed Development is described in full in **ES Volume 1, Chapter 3: Proposed Development Description [EN010149/APP/6.1]** and are secured within **Works Plans [EN010149/APP/2.3]** and Project Parameters provided in **ES Volume 3, Appendix 3.1: Project Parameters [EN010149/APP/6.3].**

2. Soil resources

2.1. Agricultural Land Classification (ALC)

2.1.1. Detailed ALC surveys have been carried out across the area within the Order Limits (see **Location, Order Limits and Grid Coordinate Plans [EN010149/APP/2.1]).** The results of the ALC survey are set out in **ES Volume 3, Appendix 11.1a-c: Agricultural Land Classification Reports [EN010149/APP/6.3]**.

2.1.2. As set out in the ALC survey, the soils within the Order Limits are predominantly developed over limestone of two different geological types, Great Oolite and Inferior Oolite. These soils are spatially variable over short distances, due to variations in soil depth to impenetrable rock, type of bedrock, stone/rock content and soil textures leading to a complex pattern of ALC Grade 2, Subgrade 3a and Subgrade 3b land. The main limitation to agriculture is soil droughtiness on Aswarby, Marcham and Elmton 1 soil association soils; see **ES Volume 3, Appendix 11.1a-c: Agricultural Land Classification Reports [EN010149/APP/6.3]**.

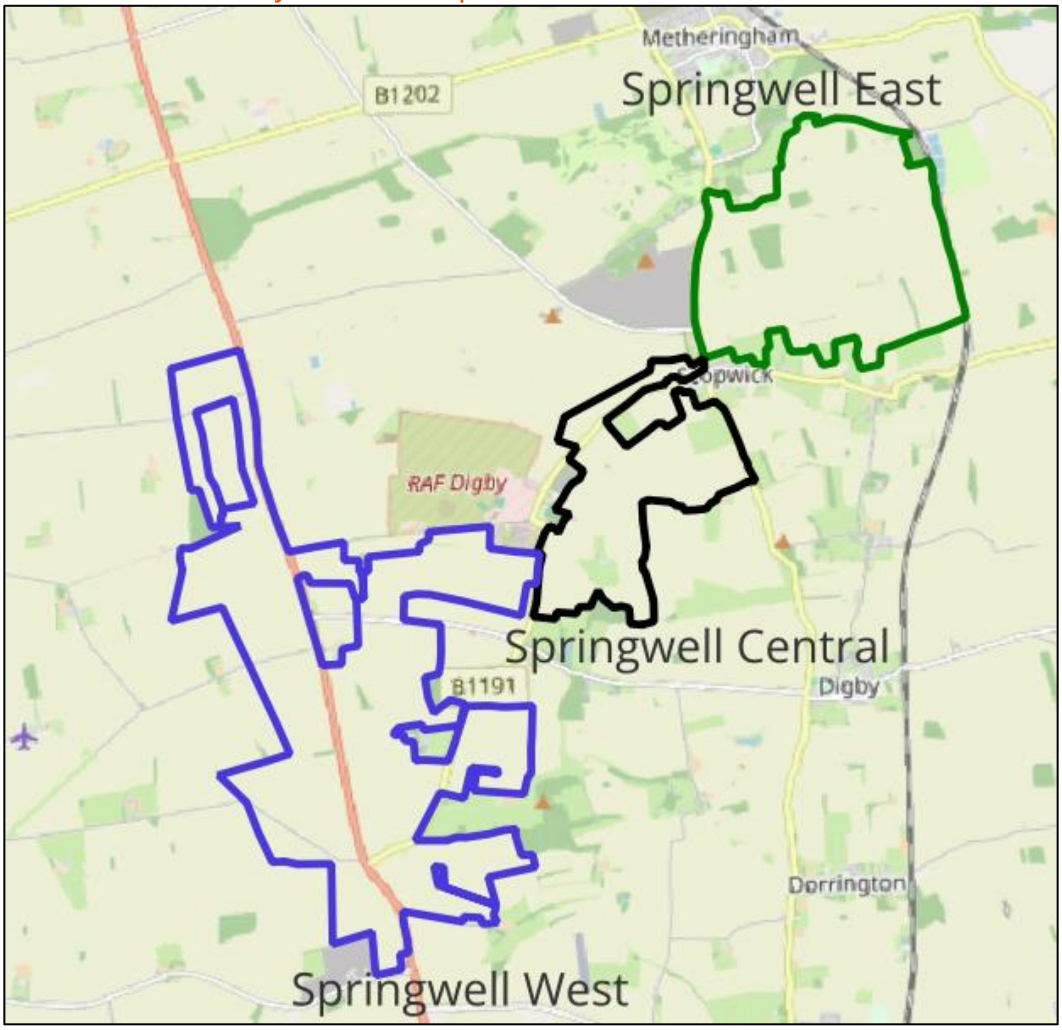
2.1.3. The ALC survey divided the Order Limits into three areas; Springwell East, Springwell Central and Springwell West, as shown on **Plate 1** below.

2.1.4. A summary of the findings are detailed below in **Table 1**:

Table 1 – Agricultural Land Classification (ALC) survey results of the Order Limits

Agricultural Land Classification Grade	Area (ha)	Percentage (%)
Grade 1	6.0	0.5
Grade 2	80.1	6.3
Grade 3a	455.1	35.6
Grade 3b	582.6	45.5
Unsurveyed land (field verges, internal tracks etc)	152.0	11.8
Total BMV	**541.2**	**42.3**
Total non-BMV	**586.0**	**45.9**
Total	**1280.0**	**100.00**

Plate 1: ALC Survey Section Map



2.2. Characterisation

2.2.1. As detailed in the ALC survey, the dominant characteristic affecting the agricultural quality of land within the Order Limits is depth to and type of limestone.

Soil Types

2.2.2. Multiple soil types are found across the Site, which can loosely be placed into four main groups:

a) shallow, calcareous, free draining, fine loamy soils over limestone;

b) shallow, calcareous, moderately free draining, fine loamy over clayey soils, over limestone;

c) deep, imperfectly draining, fine loamy/clayey topsoils over clayey subsoils; and

d) freely draining coarse loamy/sandy soils.

Springwell West

2.2.3. The National Soils Map **[Ref 1]** records the fields in Springwell West as mostly belonging to the Marcham soil association.

2.2.4. Marcham soils are typically well-drained and permeable calcareous fine and coarse loamy soils that are shallow over limestone and readily accept winter rainfall with little surface run-off.

2.2.5. The ALC survey found two main soil types present within Springwell West:

- Freely draining calcareous shallow sandy soils over shattered limestone; and
- Moderately to imperfectly draining calcareous clayey soils.

Springwell Central

2.2.6. The National Soils Map **[Ref 1]** records the fields in Springwell Central as mainly belonging to the Aswarby soil association, with six fields located in the northern end of Springwell Central mapped as Marcham association.

2.2.7. Aswarby soil association soils are calcareous, well drained, occasionally waterlogged soils which are comprised of Jurassic limestone and clay.

2.2.8. Marcham soils are typically well-drained and permeable calcareous fine and coarse loamy soils that are shallow over limestone and readily accept winter rainfall with little surface run-off.

2.2.9. The ALC survey found five main soil types present within Springwell Central:

- Calcareous loamy soils over hard limestone;
- Calcareous loamy soils over hard shattered limestone;
- Calcareous loamy soils over soft shattered limestone;
- Imperfectly draining calcareous deep clayey soils; and
- Moderately freely draining calcareous loamy soils.

Springwell East

2.2.10. The National Soils Map **[Ref 1]** records land in Springwell East as belonging to the Aswarby, Beccles 1, Curdridge, Elmton 1, Marcham and Isleham 2 soil associations.

2.2.11. Aswarby soil association are calcareous, well drained, occasionally waterlogged soils which are comprised of Jurassic limestone and clay.

2.2.12. Beccles 1 soils are seasonally waterlogged fine loam over clayey soils. Curdridge soils are coarse loamy soils formed on sandstone that suffer from season waterlogging and groundwater effects.

2.2.13. Elmton 1 soils are calcareous fine loamy soils over limestone. Marcham soils are well-drained and permeable calcareous fine and coarse loamy soils that are shallow over limestone.

2.2.14. Isleham 2 association soils have sandy and peaty topsoil with a pale grey subsoil becoming grey and mottled below.

2.2.15. The ALC survey found six main soil types present within Springwell East:

- Non-calcareous loamy soils over seasonally waterlogged clay;
- Calcareous heavy soils over shattered limestone;
- Silty clay soil with poorly developed subsoil;
- Freely draining non-calcareous sandy soils;
- Non-calcareous imperfectly draining clay; and
- Moderately freely draining loamy soils.

Climatic Conditions

2.2.16. The climatic data for the area, using the climate data set for ALC **[Ref 2]**, shows annual rainfall of approximately 600mm across the Order Limits.

2.2.17. ‘Field Capacity’ is a measure of the duration of climatic wetness when soils hold the maximum amount of water. In a normal year, the soils are likely to return to Field Capacity from late autumn and remain at Field Capacity until early spring with soils at the Site typically at Field Capacity for 118 - 121 days per year. This is the period when soils are most susceptible to damage because they are saturated.

2.2.18. The planning of construction works should take this into consideration and seek to undertake minimal transversing across the Site and soil handling during this period or develop appropriate measures to do so such as the use of matting. This would involve the temporary installation of track matting along haul routes to reduce soil rutting/compaction.

Propensity to Damage

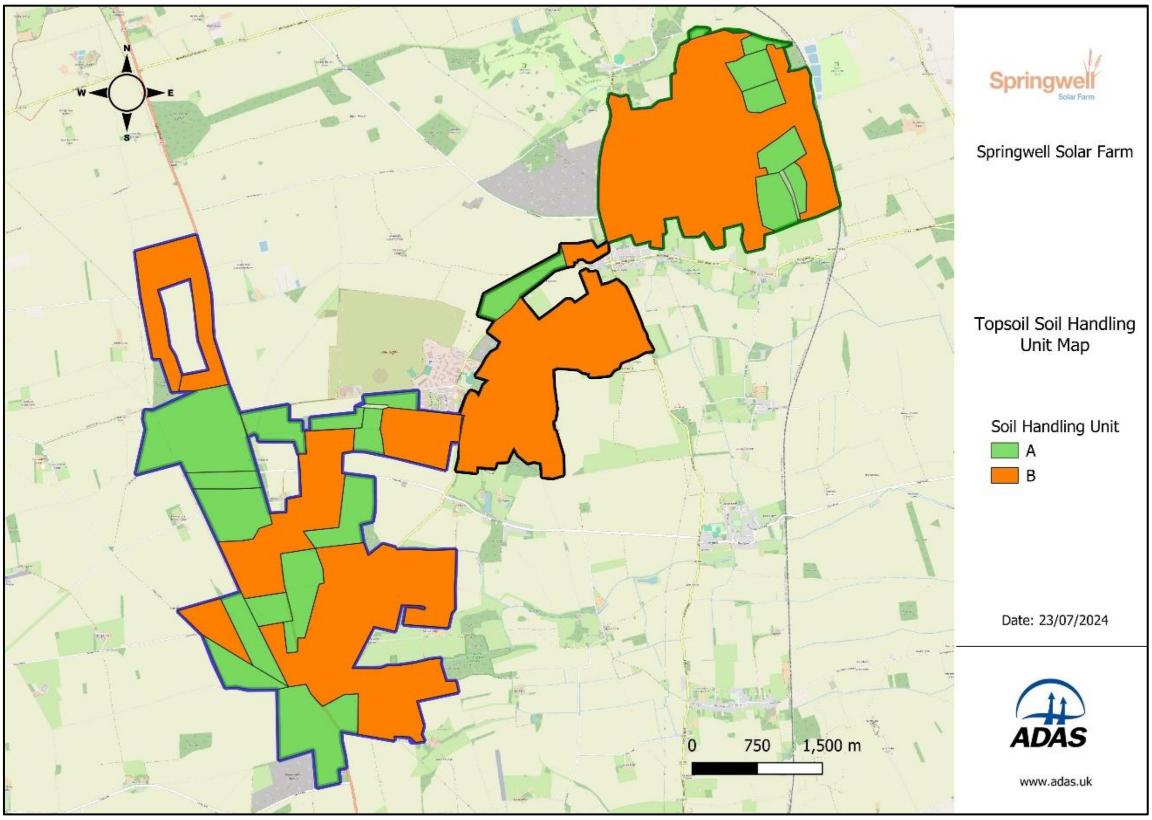
2.2.19. The Institute of Environmental Management and Assessment (IEMA) guide "A New perspective on Land and Soil in Environmental Impact Assessment, 2022" **[Ref 3]** details that, at locations with fewer than 150 Field Capacity Days (FCD), medium (loamy) and heavy (clayey) soils have a Medium resilience to structural damage during handling (Soil Handling Unit {SHU} B). Light (sandy) soils have a High resilience to damage (SHU A) as shown in **Table 2**.

Table 2: Soil resilience to structural damage classification

Soil Handling Unit	Resilience to Structural damage during soil handling in a dry condition	Soil texture class
A (Green)	High	Soils with a high sand fraction (sands, loamy sands, sandy loams and sandy silt loams) where the Field Capacity Days are fewer than 225 and are in wetness classes WCI to WCII
B (Orange)	Medium	Clays, silty clays, sandy clays, heavy silty clay loams, heavy clay loams, silty loams and organo-mineral and peaty soils where the Field Capacity Days are fewer than 150. Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams) where Field Capacity Days are fewer than 225. Sands, loamy sands, sandy loams and sandy silt loams where the Field Capacity Days are 225 or greater or are in wetness classes WCIII and WCIV
C (Red)	Low	Soils with high clay and silt fractions (clays, silty clays, sandy clays, heavy silty clay loams and heavy clay loams) and organo-mineral and peaty soils where the Field Capacity Days are 150 or greater. Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams) where the Field Capacity Days are 225 or greater. All soils in wetness class (WCV or WCVI).

2.2.20. Whilst the pattern of soil types across the Order Limits is complex, areas of different soil handling units are relatively distinct as shown in **Plate 2**. Approximately two thirds of the land has SHU B topsoil which are moderately susceptible to damage during handling. Much of the land within the Springwell West and a north-south band of land through the eastern half of Springwell East have predominantly SHU A, high resilience topsoils. These will be the least prone to compaction if trafficked in the wetter mid-winter months.

Plate 2: Soil Handling Unit Map



Topsoil Handling Units

2.2.21. Works involving trafficking on the topsoil during the winter months will need to be carried out carefully, otherwise there may be an increased need for amelioration in the spring. If Site work during the winter period is unavoidable, the more resilient SHU A soils will be prioritised for working on during this period.

Springwell West

2.2.22. The main soil type, which is found across most of Springwell West, is freely draining calcareous shallow sandy soil over shattered limestone. Topsoils are mostly either sandy loam or sandy clay loam in texture, so have a High (SHU A) or Medium (SHU B) resilience to structural damage during soil handling respectively.

2.2.23. Moderately to imperfectly draining calcareous clayey soils are found in two areas to the east of Springwell West. Topsoils are medium or heavy textured and have a Medium (SHU B) resilience to structural damage during soil handling at this location with <150 Field Capacity Days.

Springwell Central

2.2.24. Calcareous loamy soils over hard limestone, over hard shattered limestone or over soft shattered limestone are found across much of Springwell Central. They have medium and heavily textured topsoils which have a Medium (SHU B) resilience to structural damage during soil handling.

2.2.25. Imperfectly draining calcareous deep clayey soils are found in the south of Springwell Central. These soils have heavy textured topsoils which have a Medium (SHU B) resilience to structural damage during soil handling.

2.2.26. Moderately freely draining calcareous loamy soils are found in the north-east of Springwell Central. They have medium and heavy textured topsoils which have a Medium (SHU B) resilience to structural damage during soil handling.

Springwell East

2.2.27. A complex pattern of soil types are found within Springwell East, with 6 main soil types, although four of these have similar topsoils with the same level of resilience to damage during soil handling.

2.2.28. Non-calcareous loamy soils over seasonally waterlogged clay are located close to the eastern boundary of Springwell East; calcareous heavy soils over shattered limestone are found in the north-west and centre of the section; silty clay soil with poorly developed subsoils occur most frequently in the northern centre of the section; and non-calcareous imperfectly draining clay are found most frequently to the south of the section. Each of these four soil types has heavy textured topsoil which has a Medium (SHU B) resilience to damage during handling.

2.2.29. Freely draining non-calcareous sandy soils are most frequently found in the south-east of Springwell East. With sandy topsoils, these have a High Resilience (SHU A) to damage during handling.

2.2.30. Moderately freely draining loamy soils occur in the northern corner of Springwell East. Topsoils are medium or heavy textured, so have a Medium resilience to damage during handling (SHU B).

3. Construction – key principles

3.1.1. Across most of the land within the Order Limits, soils will remain *in situ* throughout the project. Measures detailed in this oSMP are designed to minimise the impact of trafficking on the *in situ* soil during construction and amelioration measures to restore soils where damage has occurred.

3.1.2. The main potential impacts upon land will be trafficking by vehicles involved in the installation of solar arrays and fencing. This has the potential to compact and damage soils. The main mitigation methods will be to avoid working in unsuitable conditions and to utilise low ground pressure vehicles (tracked vehicles or vehicles fitted with tyres designed to operate at low inflation pressures) wherever possible.

3.1.3. Whilst mitigation methods will reduce impacts upon the soil during installation of the Solar PV arrays, some damage or compaction is inevitable. Agricultural land is routinely trafficked by farm machinery during farm operations and resultant compaction alleviated using standard farm equipment, such as grassland slitters, spikers or subsoilers followed by discing, harrowing and/or rolling if levelling is required. Similar tractor operated farm cultivation equipment will be used to ameliorate localised damage resulting from the solar installation.

3.1.4. All soil trafficking and handling operations will be undertaken under the supervision of an appropriately trained and experienced person, who will advise on and supervise soil handling, including identifying when soils are dry enough to be handled.

3.1.5. Site inspections of the soil condition prior to vehicle movements across the Site are required, particularly during wet weather conditions.

3.1.6. The key principles for minimising damage to soils are:

- Timing;
- Retaining soil profiles;
- Avoiding compaction;
- Ameliorating compaction; and
- Storing soils for re-use.

3.2. Timing

3.2.1. Timing of soil operations is the most critical management decision to minimise soil damage.

3.2.2. Within the Order Limits the ALC data indicates that soils will be at Field Capacity for a period of approximately 120 days in an average year, typically between mid-November and mid-March, although this commonly varies by 4 weeks either side of these dates. During this period there is an increased risk of localised damage to soil structure from trafficking and soil handling, particularly SHU B soils.

3.2.3. If sustained heavy rainfall (e.g. >10mm in 24 hours) occurs during soil handling operations, work must be suspended and not restarted until the ground has had at least a full dry day or agreed moisture criteria (such as 'drier than the plastic limit') can be met. Lighter soil (SHU A) can generally be moved at a higher moisture content without damage than a heavy soil.

3.2.4. Soil stripping, storing and restoration operations should only occur when the soils are as dry as reasonably practicable, normally when they are below the plastic limit. A suitably trained person should test the soil plasticity prior to soil handling operations, following the procedure detailed below in **Tables 2, 3** and **4**.

Table 3: Visual Assessment of Soil Moisture

Soil Condition	Procedure
If the soil is wet, films of water are visible on the surface of the soil particles or aggregates and/or when a soil sample is squeezed by hand and readily deforms into a 'cohesive' ball	No handling
Soil peds readily break up or crumble when squeezed in the hand	Handling ok
If the sample is moist (a slight dampness when squeezed by hand) but the soil colour does not change upon further wetting	Handling ok if undertaken by tracked excavator and consistency test is passed
If the sample is dry and darkens if water is added the soil is brittle	Handling ok if consistency test is passed

Table 4: Consistency of the Soil Sample (1)

3.2.5. Attempt to mould a soil sample into a ball by hand:

Soil Condition	Procedure
Impossible because the soil is too hard or dry	Handling ok
Impossible because the soil is too loose (dry)	Handling ok
Impossible because the soil is too loose and wet	Handling not ok
Possible	Go to consistency test (2)

Table 5: Consistency of the Soil Sample (2)

3.2.6. Attempt to roll the ball by hand into a thread of 3mm diameter on a flat non-adhesive surface:

Soil Condition	Procedure
Impossible, the soil crumbles or disintegrates	Handling ok
Possible	No handling

3.2.7. If it is not possible to strip topsoils when they are below the plastic limit, they should be deposited into windrows prior to lifting them into their final bund once they have dried out sufficiently.

3.2.8. Once test results indicate that soil to be handled or trafficked is in a suitable condition (below the plastic limit), further assessment is not required until there is a significant rain event (>10mm in the previous 24 hours).

3.2.9. Soil handling methods will normally be as specified by the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites **[Ref 4]**.

3.3. Retaining soil profiles

3.3.1. Cabling installations require trenches to be excavated. These are usually dug to a depth below the topsoil, requiring some subsoil removal.

3.3.2. Topsoil and subsoil should be stored separately and restored in the same order to retain the original soil profile.

3.3.3. It is possible that a second, clearly different subsoil is encountered during trench excavation. This lower subsoil is most frequently of poorer quality for agriculture and, where possible, should be stockpiled separately and restored below the upper subsoil and topsoil to retain the original profile.

3.3.4. It is likely that limestone will require excavation during trenching works in order to lay the cable at the required depth. Any limestone removed should be temporarily stored separately from soil (alongside the trench) and then restored using the same 'last out first in' principle as with the soils in order to retain the original soil profile.

3.4. Avoiding compaction

3.4.1. The most critical factors in avoiding compaction are to, when at all possible:

- work when soils are dry (see Paragraphs 3.2.2, 3.2.3 & 3.2.4);
- use low ground pressure vehicles/plant; and
- avoiding trafficking of soil by using designated haul routes.

3.5. Ameliorating compaction

3.5.1. A degree of compaction is likely during operations trafficking on the land or handling soils during the installation. This compaction should be ameliorated at an appropriate time and during suitable conditions.

3.5.2. Specific details of amelioration methods following each different operation are detailed below in **Sections 4 to 8**.

3.6. Storing soils for re-use

3.6.1. The Proposed Development should be constructed with the aim of keeping the soils in store for as short a time as possible, whilst minimising damage to the soil or Site. It is acknowledged that a small amount of soil will need to be stored for the duration of the Proposed Development.

3.6.2. As most of the land within the Order Limits will not have any soil removed, volumes of soil to be stored will be relatively small. Soil storage will fall into two main categories: short-term storage and long-term storage.

3.6.3. Soils removed during cable trenching, fencing, temporary haul road construction and temporary compound construction will be stored for the short term; no longer than the duration of the construction phase. Soils excavated during cable trenching and fencing works are likely to be stored for a much shorter period of time.

3.6.4. Soil removed during the construction of infrastructure, such as for the Springwell Substation, Main Collector Compound, BESS and access tracks which will remain in situ until decommissioning of the Proposed Development and will require storage for the duration of the operational phase (including maintenance) of the Proposed Development.

3.6.5. The following points should be considered when planning soil storage to keep soil aerated, reduce erosion, runoff and ponding:

- The soil bund should be no higher than 3m for topsoil.
- The soil bund should be shaped to shed water.
- The soil bund should not disrupt natural surface drainage.
- The soil bund should be seeded with a suitable grass mix.
- The soil bund should be monitored and managed for weeds.
- Grass on the soil bund should be managed either by cutting or grazing.
- A record should be kept of soil placed into storage on the Site. Each bund should be identified with the soil volume and soil unit.

3.6.6. Should any general fill materials be imported to Site during the construction phase, they should be stored in bunds not exceeding 4m in height above existing ground level.

3.6.7. Soil storage methods will normally be as specified as in the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites **[Ref 4]**.

4. Site preparation

4.1.1. In advance of the commencement of construction works, a dense grass cover will be established across the area proposed for Solar PV development to eliminate any areas of bare soil, where practicable. This will help consolidate the upper topsoil and speed up drying out after rainfall which will assist minimising soil rutting during construction and prevent sediment runoff.

4.1.2. Grass will be cut to 100mm height in all areas due to be stripped of topsoil immediately prior to work commencement.

4.1.3. Any injurious weeds, as defined by the Weeds Act 1959, growing within theSite will be eradicated or adequately controlled by approved methods.

4.1.4. Soil would be stripped, stored and replaced in line with the MAFF Good Practice Guide for Handling Soils Sheets **[Ref 5]**.

4.1.5. All topsoil and subsoil material shall be stripped from the areas affected by top soil storage bunds, subsoil storage bunds, hard-standing areas used for the temporary construction and decommissioning compounds and access tracks and, shall be stored separately in bunds from any imported material and shall be used for the restoration of the temporary soil storage unless otherwise agreed with the Local Planning Authority.

5. Import of construction materials, plant and equipment to Site

5.1.1. All construction materials, plant and equipment will be stored on existing ‘hard standing’ areas within the Site or in the temporary Construction Compounds that will be established at the start of the construction works.

5.1.2. No construction materials, plant or equipment will be stored directly on the soil surface to avoid any negative impact upon land or soils.

6. Solar PV modules

6.1.1. The Solar PV modules will be installed across the Order Limits, as illustrated in the Works Plans **[EN010149/APP/2.3]**.

6.2. Construction methodology

6.2.1. As detailed in **Section 3** of this report, installation of the Solar PV modules does not require any soil removal.

6.2.2. Trafficking over the soil surface will be limited to periods when the soil is suitably dry to minimise rutting, where practicable. Outside of these periods, measures to minimise impacts upon the soils will be implemented where necessary, such as the use of tracked vehicles. Details of soil suitability testing are set out in **Section 3.2.**

6.2.3. The Solar PV modules installation typically involves three stages:

1) Marking and laying out the mounting structures framework. This requires a low ground pressure vehicle and trailer to transport the mounting frames across the Site (see **Plate 3** below). Suitable vehicles would include bobcats or tractors fitted with low ground pressure tyres.

2) Pile driving. Support poles will be knocked into the ground with a pile driver to the required depth. Typical pile drivers used in solar installations are tracked and lightweight, resulting in minimal soil damage.

3) Construction of mounting structure. The mounting frame is constructed in situ and the panels transported to the Site using a low ground pressure vehicle and trailer. The Solar PV modules are then bolted on.

Plate 3: Example of a low ground pressure pile driver

6.2.4. The mounting structure upon which the Solar PV modules will be mounted will be pile driven or screw mounted into the ground to a maximum depth of 3m, although this maximum depth may not be possible in many areas due to shallow limestone.

6.2.5. The option to install concrete blocks known as "shoes" may also be considered, avoiding the need for driven and screw anchored installation, therefore minimising ground disturbance.

6.2.6. Provided that the ground conditions are suitable, with tyre tracks no deeper than approximately 100mm when travelling across the land, Solar PV module installation will not result in any structural damage or significant compaction of the soil.

6.3. Soil management

6.3.1. Where it can be achieved, grass establishment prior to installation works is advantageous for construction purposes, as it helps minimise rutting caused by vehicles trafficking on the soil surface. Therefore, a grass sward will be established across as much of the land to receive solar panels as soon as possible in advance of piling works, where practicable. The decision about which locations are suitable for grass seeding prior to installation will be influenced by the timing of construction works relative to the agricultural crop harvest dates and the weather and soil conditions.

6.3.2. Wheel ruts should be levelled out using standard farm equipment such as discs, harrow and rollers. Horticultural scale cultivation tools may be best suited to operating between the relatively narrowly spaced rows of solar panels.

6.3.3. Amelioration of soil ruts should be undertaken once construction of solar arrays has been completed at the location and soils have dried out. This will likely be between April and October.

6.3.4. The cultivation tools will loosen soil compaction and, when used in conjunction will a roller, produce a surface suitable for seeding/re-seeding with grass when required. This will be achieved using standard tractor mounted farm grass seeding tools.

6.4. Decommissioning

6.4.1. The current method of removing piles is to use a pile driver/extractor which vibrates the piles out of the ground, allowing for a clean extraction with minimal soil disturbance.

6.4.2. It is not possible to confirm the exact method of uninstalling the Solar PV modules and piles at the decommissioning and restoration stage of the project, as current techniques may be superseded by alternative techniques during the lifetime of the Proposed Development.

7. Infrastructure and access tracks, including upgrading existing tracks

7.1.1. Infrastructure, comprising the Springwell Substation and Main Collector Compound, BESS, Satellite Collector Compounds and Solar PV development along with associated access tracks will be installed as part of the Proposed Development within the Order Limits as detailed in the Works Plans **[EN010149/APP/2.3]**.

7.1.2. There may be a requirement for existing farm tracks to be upgraded. The specific construction methods to be employed will depend on the type and condition of the current tracks and project requirements. However, similar methodologies will be employed as for the construction of new access tracks.

7.2. Construction methodology

7.2.1. Specific construction techniques will vary depending on the specific requirements of each facility. However, this will usually involve the removal of soil prior to the construction of a hard surface; typically asphalt, concrete or compressed aggregate, to remain *in situ* for the duration of the Proposed Development.

7.3. Soil Management

Soil stripping

7.3.1. Prior to construction of a hard surface, topsoil will be stripped and stored for the duration of the lifetime of the Proposed Development. It is anticipated that this would be done during each phase of the construction works and not be undertaken all at once.

7.3.2. There may be a requirement for subsoil to also be stripped prior to surfacing. These soils will be stored separately from topsoil.

7.3.3. The Site will be cleared of any deposited rubbish ahead of soil stripping and all collected material treated as waste and managed under the Site Waste Management Plan which forms part of the Construction Environmental Management Plan.

7.3.4. Existing utilities will be clearly marked and protected by ‘no dig’ areas.

7.3.5. Any hedges, trees and fencing that are to be removed, will be removed from the working area prior to stripping the topsoil.

7.3.6. Prior to any works, tree root protection zones will be marked out and fenced off.

7.3.7. Any vegetative growth higher than 100mm will be cut or sprayed off with a systemic herbicide and removed from the Site prior to topsoil stripping. If species of invasive vegetation, such as Japanese Knotweed are encountered, they will be treated according to the particular requirements for the species encountered.

7.3.8. If any land drains are encountered, advice will be sought from a drainage specialist.

7.3.9. Typical topsoil depths within each area to be stripped will be included in the SMP prepared prior to the start of the construction works. However, this will only be used as a guide and topsoil will be stripped as deep as the base of the visibly darker topsoil layer.

7.3.10. Soil stripping will only occur when the soils are as dry as reasonably practicable, normally when they are below the plastic limit. A suitably trained person will test the soil plasticity prior to commencing work, following the procedure detailed in **Tables 3, 4** and **5**.

7.3.11. If it is not possible to strip topsoils when they are below the plastic limit, they will be loose tipped into windrows prior to lifting them into their final stockpile once they have dried out sufficiently.

Soil storage

7.3.12. Stripped soil will be stored in designated bunds at locations to be specified in the SMP.

7.3.13. The SMP will also include a map detailing the different soil units of land to be stripped. Topsoil and subsoil will be stored in separate bunds according to their soil unit.

7.3.14. Efforts will be made to minimise the potential for stockpiled soil to become anaerobic during the extensive storage period.

7.3.15. Topsoil will be stored in bunds no taller than 2m high and lightly formed to consolidate the surface and shed water. Any stripped subsoil will be stored in bunds up to 3m high.

7.3.16. Topsoil will be stored on topsoil and subsoil stored on subsoil i.e., the topsoil will be removed from areas to be used for subsoil storage bunds.

7.3.17. A record of all soils which are placed in store will be kept.

7.3.18. All bunds which will be in place for more than 6 months will be sown with a low maintenance grass seed mix at a rate of 5g/m^2.

7.3.19. If grass cover is not practicable, hessian, mulches or similar will be used.

7.3.20. All bunds will be labelled with their historic land use, volume and soil type (e.g. pasture, ***m^3; Unit 1 topsoil).

7.3.21. All soil bunds will be inspected annually in the spring to ensure that the grass cover is intact and to decide if an herbicide is required to control invasive weeds. The species present will determine the most appropriate herbicide or cutting regime.

7.4. Decommissioning

7.4.1. Any concrete bases or asphalt will need to be broken up. This will most likely involve breaking with a pneumatic drill or back-actor bucket to crack the base, after which it can be dug up and loaded onto trailers and removed.

7.4.2. Compressed aggregate will be removed using an excavator, along with any membrane placed on the subsoil surface.

7.4.3. The cleared surface will be soil sampled in any areas at risk of having been contaminated. Samples will be collected and submitted to UKAS and MCERTS accredited laboratories for a range of commonly occurring pollutants such as metals, oils and polycyclic aromatic hydrocarbons (PAHs). Results will be assessed by a land contamination specialist and any required remediation advice will be followed.

7.4.4. It is likely that the soil beneath the hard surface will require subsoiling to remove compaction. A soil scientist or suitably trained person will assess the depth and severity of compaction to inform the type and depth of subsoiling operation required.

7.4.5. Subsoiling will be undertaken using tractor mounted farm equipment, such as detailed in **Plate 4** below.

` Plate 4: Tractor mounted subsoiler

7.4.6. Subsoiling will only be undertaken when soils are dry, as plastic soils would smear and likely exacerbate the compaction.

7.4.7. At least 2 passes of the subsoiler will be made across each area, at an angle of 45 to 60 degrees to each other in order to fully break up the soil to the required depth.

7.4.8. If required due to damage to an existing drainage system, new drains should be installed into the subsoil, prior to topsoil reinstatement.

7.4.9. Approximately a month prior to restoration, soil stockpiles should be strimmed, cuttings removed and remaining vegetation sprayed with a systemic herbicide as advised by a suitably qualified person.

7.4.10. As with all soil handling operations, stockpiled soils will only be handled when in a suitable condition, to be decided by a suitably trained person. This would usually be between May and October.

7.4.11. Soils will be transported and tipped using a dumper, with an excavator used to position the soil across the area to be restored.

7.4.12. Topsoil depth will be checked during restoration. As newly restored soils slump over time, an allowance for this will be made, establishing approximately 10-20% deeper loose topsoil than the final target depth detailed in the SMP.

7.4.13. The excavator will 'work its way backwards' from the far end of the restoration area, so as not to operate on the newly placed soil. No vehicles should traffic over restored topsoil.

7.4.14. Reinstatement of soil will be monitored by a suitably qualified person and records of operations kept, with photographic evidence.

7.5. Aftercare

7.5.1. On completion of the restoration works the soils will be in a fragile condition and all works will be geared towards stabilising the soil structure and establishing a strongly growing crop to ensure the best chance of a successful and sustainable restoration.

7.5.2. The condition of field drainage should be assessed and reviewed for any remedial action.

8. Trenching and cabling works

8.1.1. Trenching will be undertaken at various locations across the Order Limits to enable cable laying between the Solar PV development, Satelliete Collector Compounds, BESS and Springwell Substation as detailed in the Works Plans **[EN010149/APP/2.3]**.

8.2. Construction methodology

Open cut trenching

8.2.1. Trenching for cable laying is mostly undertaken using a mini-digger or trenching machine, as shown in **Plate 5**.

Plate 5: Cable trenching, showing topsoil stripped and set to one side, with subsoil placed on the other side ready for reinstatement (image courtesy of British Solar Renewables)

8.2.2. Trenches would be dug to a depth of up to 1.5m, where soil depth permits, however this will vary depending on the cable type and location.

8.2.3. Cable jointing pits will be dug along the Grid Connection Corridor, with the number determined at the detailed design stage. Internal cable corridors are not expected to require jointing pits.

8.2.4. Cable jointing pits will be constructed of formed concrete.

Horizontal Directional Drilling (HDD)

8.2.5. HDD requires the establishment of launch and receptor compounds and launch and receptor pits (see **Section 10**). Temporary tracks for HDD works will be built using either a hard core base topped with crushed stone (**Section 10**) or, where possible, using temporary trackway to minimise ground disturbance.

8.2.6. The HDD temporary compounds will be enclosed with suitable fencing for the duration of the drilling activity, if located next to sensitive receptors (see **Section 9**).

8.2.7. The size of the temporary compound and drilling rig will be dictated by several factors, including the length, diameter, number of the drills and soil conditions.

8.2.8. Plant required during HDD works include a HDD rig, excavators, dumper trucks and tractors. These plant will access the drilling sites via temporary haul roads and not traverse directly on the soil surface.

8.3. Soil Management

8.3.1. Any vegetative growth higher than 100mm will be cut or sprayed off with a systemic herbicide prior to trenching. If species of invasive vegetation, such as Japanese Knotweed are encountered, they will be treated according to the particular requirements for the species encountered.

8.3.2. Trenching operations will only occur when the topsoil is suitably dry i.e. below the plastic limit for SHU B soils or by visual soil moisture assessment for SHU A soils. A suitably trained person will test the soil plasticity prior to commencing work, following the procedure detailed in **Tables 3, 4** and **5**.

8.3.3. Topsoil with be removed by excavating soils as deep as the base of the visibly darker topsoil layer and placed to one side of the trench. If it is not possible to visually identify the change from topsoil to subsoil, soil will be removed to the depth of topsoil detailed for the location in the SMP.

8.3.4. Following topsoil removal, subsoil is then removed down to the required trench depth and placed on the other side of the trench to the topsoil.

8.3.5. If a clear colour change is identified within the subsoil, the upper and lower subsoils should be stored side by side so that they can be replaced in the 'same order' as excavated.

8.3.6. Excavated soil from HDD launch and receptor compounds and pits will be temporarily stored to form separate bunds of topsoil and subsoil near to, or in, the HDD compound area, for use in backfilling following the duct and cable installation and to reinstate the HDD temporary compound areas, following methods detailed in Sections **8.3.3, 8.3.4 & 8.3.5**

8.3.7. It is unlikely that land drains will be present across the Order Limits due to the presence of shallow limestone. However, the location of any land drains damaged during the trenching operation will be marked and a log kept. Once the cable has been laid, any damaged land drains will be repaired to maintain the integrity of the drainage system. Due to the narrowness of the cabling trenches, there is no need to support repair joints with lintels, but solid/rigid pipe will be used to repair the drain which extends a minimum of 0.5m onto undisturbed soil either side of the trench.

8.3.8. Once the cable has been placed, shattered limestone and subsoils are returned to the trench, with lower subsoil placed below upper subsoil if stripped and stored separately. Subsoils will be lightly consolidated with the excavator bucket, using increased force if particularly blocky in order to reduce the amount of air gaps.

8.3.9. If it is not possible to consolidate the subsoil such that there is space for the topsoil to be restored, the topsoil will be left alongside the trench and only replaced once the subsoil has naturally settled.

8.3.10. The topsoil will be replaced with only minimal consolidation, ideally leaving a linear mound approximately 50 to 100mm high along the cable route which will settle over time.

8.3.11. Cable trenches are narrow (mostly <0.5m) and following soil replacement it is not anticipated that grass seeding will be required. However, seed will be spread by hand over any areas requiring re-seeding.

8.3.12. On completion of the restoration of HDD haul roads, compounds and pits, a strongly growing crop will be established, where practicable, to help stabilise the soil structure.

8.4. Decommissioning

8.4.1. All below ground cabling/ducting will be left in situ at the end of the decomissioning phase in order to avoid further environmental and soil damage which may result from their excavation.

9. Fencing

9.1.1. Fencing will be installed around the perimeters of the Solar PV development, Satellite Collector Compounds, BESS, Springwell Substation and Main Collector Compounds.

9.1.2. Fencing will enclose the Solar PV modules located within Works No. 1. The fields encompassing the Solar PV modules and supporting infrastructure will likely be fenced using 'deer-proof fencing', which is formed of wooden or metal posts and wire mesh.

9.1.3. Fencing would be installed around the perimeter within Works No. 2, Works No. 3, and Works No. 4 and be either palisade design or mesh design with pulse monitoring. Palisade fencing would comprise steel rails attached to horizontal-running rails connected to vertical steel joints. Mesh fencing would comprise a mesh fence with a pulse monitoring security fence inside the mesh fence.

9.1.4. Pole mounted closed-circuit television (CCTV) systems will also be installed around the perimeter of the Solar PV development, Collector Compounds, BESS and Springwell Substation.

9.2. Construction methodology

9.2.1. Fencing is likely to comprise of steel mesh attached to wooden posts which will be knocked into the ground using a post knocker mounted on a tractor equipped with low ground pressure tyres as shown in **Plate 6**. Large corner and gate posts will typically be installed using a tractor mounted auger type post hole digger as shown in **Plate 7**.

Plate 6: Post knocker

Plate 7: Post hole digger

9.2.2. Palisade fencing post holes will be dug using the same technique as detailed in **Paragraph 9.2.1**. A 50-100 mm layer of gravel will then be compacted in the base of the hole by hand. This will be brought to the Site using a tractor and trailer or small dumper. Once the post has been positioned, the holes will be filled with concrete. This will either be a bagged dry mix concrete poured into the hole by hand and then watered, or wet mixed onsite using a standard sized cement mixer, or concrete delivery lorry. Concrete will be transferred into a mortar tub to prevent soil contamination. Washings and left over concrete and cement will be disposed of safely offsite. Horizontal rails and vertical pales will be installed by hand once the concrete has set.

9.2.3. CCTV poles will be installed using the same methods detailed in **Paragraph 9.2.1.**

9.3. Soil Management

9.3.1. Fencing can be installed at any time that conditions allow vehicles to traverse the land without creating ruts deeper than 100mm.

9.3.2. Any soil rutting resulting from fencing works will be made good using the methods detailed in **Paragraphs 6.3.2, 6.3.3 & 6.3.4** .

9.4. Decommissioning

9.4.1. All fencing and CCTV poles will be removed at the end of the Proposed Development, unless requested not to do so by the landowner.

9.4.2. Fence posts and CCTV poles will be removed from the ground using equipment mounted on the back of a tractor or using a small excavator.

9.4.3. Any concrete fence post bases will be removed from the ground using an excavator and removed from Site for disposal using a tractor and trailer.

9.4.4. All large fence post holes will be filled in with subsoil and topsoil so as to reinstate the original soil profile. The source of the soil used to fill the holes will be detailed in the Soil Management Plan.

9.4.5. All fencing and CCTV equipment will be removed from site using a tractor and trailer.

10. Temporary Access Tracks and Construction and Decommissioning Compounds

10.1.1. The proposed location of Construction Compounds are detailed and secured in the Works Plans **[EN010149/APP/2.3]**.

10.1.2. These areas are intended for construction activity only and will be removed and land restored at the end of the construction phase of the Proposed Development.

10.2. Construction methodology

10.2.1. Temporary compounds and access tracks will usually be constructed of compressed aggregate on top of a permeable membrane, which is used to prevent mixing of aggregate and the soil, as shown in **Plate 7**.

Plate 7: Temporary access track

10.2.2. Topsoils will be stripped to the required depth using an excavator.

10.2.3. Aggregate will be transported to the Site and tipped by a dumper and spread over the membrane using an excavator. This will then be rolled level using a vibration roller.

10.2.4. An excavator will remove the aggregate at the end of temporary use and farm cultivation equipment used to loosen the soil surface and alleviate compaction prior to topsoil placing.

10.2.5. Topsoil will be reinstated using an excavator.

10.3. Soil management

10.3.1. Prior to stoning, topsoil will be stripped and stored in a low bund adjacent to the track or compound.

10.3.2. As soil will be stored in a linear bund alongside temporary access tracks, there will be no requirement to separately stockpile soils belonging to different soil units. Soil will be replaced in its original location.

10.3.3. If the SMP details two different soil types within a temporary compound area, these will be stripped and stored adjacent to the compound in separate labelled bunds and restored to their original location.

10.3.4. The areas will be cleared of any deposited rubbish ahead of soil stripping and all collected material treated as waste and managed under the Construction Waste Management Plan which forms part of the Construction Environment Management Plan.

10.3.5. Any hedges, trees and fencing that are to be removed, will be removed from the working area prior to stripping the topsoil.

10.3.6. Prior to any works, tree root protection zones will be marked out and fenced off.

10.3.7. Any vegetative growth higher than 100mm will be cut or sprayed off with a systemic herbicide and removed from Site prior to topsoil stripping. If species of invasive vegetation, such as Japanese Knotweed are encountered, they will be treated according to the particular requirements for the species encountered.

10.3.8. Typical topsoil depths within each area to be stripped will be included in the SMP. However, this will only be used as a guide and topsoil will be stripped as deep as the base of the visibly darker topsoil layer.

10.3.9. Soil stripping will only occur when the soils are as dry as reasonably practicable, normally when they are below the plastic limit for SHU B soils or visually assessed to be suitably dry for SHU A soils. A suitably trained person will test the soil plasticity or visually assess soil moisture prior to commencing work, following the procedure detailed in **Tables 3, 4** and **5**.

10.3.10. If it is not possible to strip topsoils when they are below the plastic limit or suitably dry by visual assessment, they will be loose tipped into windrows with the surface lightly consolidated to shed water so that once they have dried out sufficiently the topsoils can be transferred to bunds for longer term storage.

10.3.11. All bunds which will be in place for more than 6 months will be sown with a low maintenance grass seed mix at a rate of $5g/m^2$.

10.3.12. All soil bunds will be inspected in the spring to ensure that the grass cover is intact and to decide if an herbicide is required to control invasive weeds. The species present will determine the most appropriate herbicide or cutting regime.

10.4. Decommissioning

10.4.1. At the end of the temporary use period, compressed aggregate will be removed using an excavator, along with any membrane placed on the subsoil surface.

10.4.2. Aggregate removal will be undertaken with the excavator working on the aggregate and not the newly exposed soil surface, to minimise soil compaction.

10.4.3. The cleared surface will be soil sampled in any areas at risk of having been contaminated. Samples will be collected and submitted to UKAS and MCERTS accredited laboratories for a range of commonly occurring pollutants such as metals, oils and PAHs. Results will be assessed by a land contamination expert and any required remediation advise will be followed.

10.4.4. It is likely that the soil which was beneath the stoned surface will require subsoiling to remove compaction. A soil scientist or suitably trained person will assess the depth and severity of compaction to inform the type and depth of subsoiling operation.

10.4.5. Subsoiling will be undertaken using tractor mounted farm equipment, such as detailed in **Plate 4**.

10.4.6. Subsoiling will only be undertaken when soils are dry, as plastic soils would smear and likely exacerbate the compaction.

10.4.7. At least 2 passes of the subsoiler will be made across each compound area, at an angle of 45 to 60 degrees to each other in order to fully break up the soil to the required depth.

10.4.8. Several passes of the subsoiler will be made up along the length of the narrow access tracks, as there will be insufficient space to make a second pass at an angle to the first. Prior to topsoil placement, the soil should be inspected by a suitably trained person to ensure that compaction has been successfully removed.

10.4.9. If stockpiles are densely vegetated, approximately a month prior to restoration, soil stockpiles should be strimmed, cuttings removed and remaining vegetation sprayed with a systemic herbicide.

10.4.10. As with all soil handling operations, stockpiled soils will only be handled when in a suitable condition, to be decided by a suitably trained person. This would usually be between May and October.

10.4.11. Soils will be placed and spread across the area to be restored using an excavator, which will 'work its way backwards' from the far end of the restoration area, so as not to track over the newly placed soil. No vehicles should traffic over restored topsoil.

10.4.12. Topsoil depth will be checked during restoration. As newly restored soils slump over time, an allowance for this will be made, establishing approximately 10-20% deeper loose topsoil than the final target depth detailed in the SMP.

10.4.13. Reinstatement of soil will be monitored by a suitably qualified person and records of operations kept, with photographic evidence.

10.4.14. On completion of the restoration works the soils will be in a fragile condition. A strongly growing crop will be established, where practicable, to help stabilise the soil structure and ensure the best chance of a successful and sustainable restoration.

11. Upgrading/construction of ditch crossing points

11.1. Construction methodology

Pipe

11.1.1. There may be a requirement depending on the flow of water to divert the flow to an alternative route or through an adjacent culvert, pipe or channel.

11.1.2. If diversion is not possible then a temporary sump will be excavated upstream from the culvert work area, the ditch would then be dammed, and silt fencing installed. Water will be piped and pumped past the work area to join the waterflow downstream from the culvert work area.

11.1.3. The culvert bed is excavated, and a layer of binding concrete is placed in the bed.

11.1.4. The pipe sections are lifted into place with the excavator, the area over the pipe will then be backfilled to any cable crossing level and compacted with granular material, any cable crossing ducts will be installed perpendicular to the culvert pipe. The culvert and cable duct will then be backfilled to the entry exit level. If wing walls are required, they will be constructed in situ from either concrete, gabion baskets, dry-filled concrete sandbags or other suitable material, following which waterproofing and backfilling of these walls will take place.

11.1.5. The watercourse will then be diverted through the new culvert pipe, allowing road/track construction.

Precast box sections

11.1.6. There may be a requirement depending on the flow of water to divert the flow to an alternative route or through an adjacent culvert, pipe or channel.

11.1.7. If diversion is not possible then a temporary sump will be excavated upstream from the culvert work area, the ditch would then be dammed, and silt fencing installed. Water will be piped and pumped past the work area to join the waterflow downstream from the culvert work area.

11.1.8. The culvert bed is excavated, and concrete ground beams to support the arts sections placed.

11.1.9. The precast culvert sections well be lifted into place with a tracked excavator. The area over the precast box culvert will then be backfilled to any cable crossing level and compacted with granular material, any cable crossing ducts will be installed perpendicular to the precast culvert box. The culvert and cable duct will then be backfilled to the entry exit level. If wing walls are required, they will be constructed in situ from either concrete, gabion baskets, dry-filled concrete sandbags or other suitable material, following which waterproofing and backfilling of these walls will take place.

11.1.10. The watercourse will then be diverted through the new precast concrete culvert, allowing road/track construction.

11.2. Soil management

11.2.1. Pipe installation and precast box section installation works would be completed using a tracked excavator to dig temporary sumps, dam the ditch, excavate the culvert bed and lift the pipe/culvert into place.

11.2.2. Tracked excavators are low ground pressure vehicles and have minimal impact upon soil. Should soil compaction i.e. rutting occur, this will be ameliorated using methods detailed in **Sections 6.3.2, 6.3.3 & 6.3.4**.

11.2.3. Should concrete be required to line the ditch bed or construct wing walls, then this will either be mixed onsite or delivered by concrete truck. If mixed onsite, it will be wet mixed onsite using a standard sized cement mixer or delivered by concrete lorry. Concrete will be transferred into a mortar tub to prevent soil contamination. Washings and left over concrete and cement will be disposed of safely offsite.

11.2.4. Equipment and materials required, such as sandbags, pre-cast concrete, gabion baskets and stone, will mostly be transported to site using a tractor and trailer or similar low ground pressure vehicle. If there is a requirement to transport bulky or heavy materials to Site using a low ground pressure vehicle, flatbed HGV or concrete truck, a temporary haul road will be constructed, either following the methodology detailed in **Section 10**, or using track matting. Any significant soil rutting along the transport route will be ameliorated as detailed in **Sections 6.3.2, 6.3.3 & 6.3.4**.

11.3. Decommissioning

11.3.1. Removal of ditch crossings may be required at Site restoration. If so, all concrete structures, pipework and other materials used during ditch crossing construction will be removed from Site.

11.3.2. A tracked excavator would be used to deconstruct concrete structures, sand bags, pipes and aggregates.

11.3.3. Materials will be removed from Site using a tractor and trailer or similar low ground pressure vehicle.

11.3.4. If there is a requirement to transport bulky or heavy materials away from Site, low ground pressure vehicles such as dumper trucks would be used, alternatively if this is not practicable, a temporary haul road will be constructed, either following the methodology detailed in **Section 10**, or using track matting. Any significant soil rutting along the transport route will be ameliorated as detailed in **Sections 6.3.2, 6.3.3 & 6.3.4**.

12. Green infrastructure

12.1.1. Various types of Green Infrastructure will be established as part of the Proposed Development. These include:

- Calcareous grassland;
- Neutral grassland meadow;
- Arable field margins (wild bird cover/seeding);
- Tussocky grass field margins;
- Grassland open fields and margins with wildflowers;
- Legume-rich modified grassland (underneath Solar PV modules);
- Tree belt, tree and hedgerow planting;
- Construction of an earth bund within Field Tb2 between the Springwell Substation/BESS and the A15; and
- Establishment of new PRoW and Permissive Paths.

12.1.2. Tree and hedgerow plants to be planted will predominantly be young transplants or ‘whips’ which will be hand planted. As no vehicles or heavy equipment will be employed, no significant soil damage is anticipated.

12.1.3. Some extra heavy standard trees will also be planted when more mature specimens are required. These would be planted in holes dug by a small excavator or tractor with backhoe and no significant soil damage is anticipated.

12.1.4. Standard farm practices and equipment will be employed when establishing grassland and works will be undertaken when soil conditions are suitably dry.

12.1.5. Construction of the earth bund to the west of the A15 road within Field Tb2 will be undertaking using methods and equipment detailed in the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites [**Ref 4**].

12.1.6. Topsoil will be removed and temporarily stored adjacent to the works using excavators or dozers.

12.1.7. Subsoil resulting from reprofiling the Site of the BESS will be used to construct the bund. The material will be moved and positioned on the stripped area using excavators or dozers.

12.1.8. The original topsoil from the location of the bund will be placed on top of the subsoil and formed prior to seeding.

12.1.9. Plant used to move soils will not traffic on topsoil outside the footprint of the bund being constructed.

13. Testing and commissioning

13.1. Cold commissioning

13.1.1. Cold commissioning is the testing of installed cables before it is energised.

13.1.2. Cold commissioning is anticipated to be undertaken after the installation of the Solar PV development, BESS and Springwell Substation.

13.1.3. This activity should not require any additional or specialist vehicles to those already included in the construction, nor impact the land and soils.

13.2. Hot commissioning

13.2.1. Hot commissioning is the process of live testing of installed equipment including cables at DC, low voltage and high voltage up to 400kV.

13.2.2. Hot commissioning will take place following the cold commissioning of a phase of Solar PV development, BESS and Springwell Substation, and will be phased to include grid code compliance and HV safety rules.

13.2.3. Hot commissioning is unlikely to require any additional or specialist vehicles, above those already included in the construction period. However, on occasions, this may require the use of generators or load banks, which would usually be delivered via HGV flatbed lorry or articulated lorry. These vehicles/machines, if used, would be restricted to haul roads and compound areas only and not impact the land or soils.

14. Site reinstatement

14.1.1. Specific details, methods and equipment used during Site reinstatement on completion of the project are detailed within the specific sections for each aspect of the Proposed Development.

- Solar PV modules – **Section 6.4**
- Infrastructure and access tracks – **Section 7.4**
- Trenching and cabling – **Section 8.4**
- Fencing – **Section 9.4**
- Temporary access tracks and construction and decommissioning compounds – **Section 10.4**
- Ditch crossings – **Section 11.3**

14.1.2. Once all solar infrastructure has been removed, the Site will be inspected.

14.1.3. Following decommissioning, the land will be reinstated and returned to the condition it was prior to the installation of the Proposed Development.

15. Monitoring and Aftercare

15.1.1. Soil conditions will be monitored by an appropriately trained person prior to soil handling operations, as detailed in **Paragraphs 3.1.4 and 3.1.5**. Soil plasticity testing will be undertaken by an appropriately trained person following the procedure detailed in **Paragraphs 3.2.4, 3.2.7, 3.2.8, 3.2.9** and **Tables 3, 4, & 5**. Records of plasticity test results should be taken and retained.

15.1.2. The grassland under the Solar PV modules will be managed in line with the Landscape and Ecology Management Plan.

15.1.3. No significant adverse effects on land or soil are anticipated during the operation phase, so there is no requirement for annual monitoring or reviews.

15.1.4. All areas of the Site where soil has been restored for agricultural use will be inspected and any localised settlement/slumping that may adversely affect agricultural use should be regraded, including the reconstruction of the soil profile to approved specification.

16. References

- **Ref 1** Agricultural Land Classification Map: East Midlands Region (ALC005). Natural England. Available online: https://publications.naturalengland.org.uk/publication/143027
- **Ref 2** Climatological Data for Agricultural Land Classification; 1989. Available online: https://publications.naturalengland.org.uk/file/4830386468159488
- **Ref 3** IEMA. A New Perspective on Land and Soil in Environmental Impact Assessment, 2022
- **Ref 4** Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites - https://assets.publishing.service.gov.uk/media/5b2264ff40f0b634cfb50650/pb13298-code-of-practice-090910.pdf
- **Ref 5** Ministry of Agriculture, Fisheries and Food (MAFF). Good Practice Guide for Handling Soil (2000).

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