Cottam Solar Project

Environmental Statement Appendix 19.2:
Outline Soil Management Plan
Revision B

Prepared by: Daniel Baird Soil Consultancy Ltd
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Cottam
SOLAR PROJECT

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Issue Sheet

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Environmental Statement Appendix 19.2: Outline Soil Management Plan Revision B

Prepared by:

Name: Daniel Baird

Title: Soils Consultant M.I. Soil Sci.

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1 Introduction

1.1 Summary

1.1.1 This outline Soil Management Plan (SMP) has been prepared by Daniel Baird Soil Consultancy Ltd (Baird Soil) and accompanies an application under Section 37 of the Planning Act 2008 to the Secretary of State for a Development Consent Order (DCO) for the Cottam Solar Project.

1.1.2 This Outline SMP has been prepared and submitted in support of the DCO Application. A detailed SMP will be prepared in accordance with this Outline SMP, as a requirement of the DCO and would be approved by the relevant local planning authorities in advance of starting the construction works.

2 Aims

2.1.1 The aim of the SMP is the preservation of the soil resource at the site during construction, operation and decommissioning - avoiding both the loss of soil material from the site and the loss of soil functional capacity for supporting agricultural production.

3 General Principles

3.1.1 Key threats to the soil resource at construction sites are trafficking of vehicles/plant and poor handling, which can cause damage to soil structure through compaction and smearing. These effects compromise the ability of the soil to perform functions, such as providing adequate water, air and nutrients to plant roots. The risk of compaction and smearing increases with soil wetness. To minimise the risk of damage to soil structure, the SMP will include measures to:

- Prepare a plan of topsoil units within the Sites and the Cable Route Corridor, that should not combined or exchanged in soil handling operations;
- minimise trafficking of vehicles/plant over in situ or bunded soils to occur outside demarcated working areas;
- minimise trafficking of vehicles/plant on reinstated soil (topsoil or subsoil);
- establish and maintain a grass sward over the Solar PV area before trafficking over by construction plant and delivery vehicles;
- avoid soil handling when its moisture content is above the plastic limit (the moisture content at which soil begins to behave as a plastic material and the soil is deemed too wet to handle without causing damage to the soil structure);
- soil handling should be by excavator and dump truck as per sheets A to D of the Institute of Quarrying Good Practice Guide for Handling Soils in Mineral Workings (Ref.1);
- avoid handling of soils to be carried out during periods of prolonged, heavy rainfall;

- minimise mixing of topsoil with subsoil, or of soil with other materials;
- ensure soil is only stored in designated soil storage areas;
- ensure plant and machinery only work when ground or soil surface conditions enable their maximum operating efficiency (i.e. when machinery is not at risk of being bogged down or skidding causing compaction or smearing);
- maintain all plant and machinery in good working condition to ensure that the soil is stripped correctly, for example to ensure that the depth of the strip can be accurately controlled, and to minimise the risk of contamination through spillages; and
- keep daily records of operations undertaken, and site and soil conditions during soil handling activities;
- use low ground pressure (LGP models) and tracked vehicles where possible when working directly on bare or vegetated soils to minimise the extent and/or intensity of the soil loosening/decompaction required after reinstatement

3.1.2 The Plastic Limit can be assessed in the field and a methodology is given in Supplementary Note 4 of the Good Practice Guide for Handling Soils in Mineral Workings. Soil is in a plastic condition when it is moist enough to be rolled between hand and a smooth surface (metal plate or ceramic tile) into a roll of 3.2mm (1/8 inch) thickness. If the soil roll crumbles before reaching this thickness it is not plastic. Once a plastic consistency has been reached following rainfall, soil handling work and trafficking over unprotected soil should be suspended until the soil has dried sufficiently to no longer be plastic.

3.1.3 The majority of the proposed Solar PV development will comprise rows of solar panels mounted over pasture. There will be no requirement to move or seal soil below foundations for this land. Therefore, the risks to the soil resource are minimal compared to minerals extraction or built development of a similar scale. Elements of the development that will require the stripping and storage of topsoil within the Sites include the access tracks and switchgear housings. Soil excavated for cable trenches within the Sites and along the Cable Route Corridor will be quickly returned to the backfilled trench and not need to be placed in storage bunds for the duration of the development.

3.1.4 Adoption of these principles in the SMP will conserve the soil resource, both in terms of volume and its functional capacity for the support of agricultural production. As a result, there should be no degradation of the baseline ALC grade following decommissioning work.

4 Soils Data

4.1.1 The detailed Agricultural Land Classification (ALC) assessment of the solar energy park provides the information on soil physical characteristics that will assist in the development of the SMP. Before construction work commences, additional soil surveys should be undertaken on the route of the grid connection works, as a

condition of the DCO, to provide similarly detailed data on soil physical characteristics within the Cable Route Corridor for the SMP. The Cable Route Corridor will have buried cable trunking linking the Cottam 1, 2, 3a and 3b areas to a grid connection point. Prior to work commencing this Cable Route Corridor should be subject to a survey to record soil physical characteristics such as horizon depth and texture. A detailed ALC survey, as undertaken for the Sites, would not be appropriate as the 100m spacing of sample points would be widely spaced around the narrow trench excavation. Instead a specific sampling of soil within the proposed Cable Route Corridor should be undertaken as part of the final SMP. This will enable effective segregation of topsoil and subsoil horizons during excavation and infilling of the cable trench.

5 Pre-Work Condition

5.1.1 The development site is arable land, subject each year to a succession of cultivation passes and trafficking by high axle load vehicles such as grain trailers and combine harvesters. Topsoils are heavy to medium textured their clay content making the soil vulnerable to persistent structural degradation if disturbed in a plastic consistence. This can be alleviated in a topsoil through appropriate cultivation when friable. Subsoil compaction rapidly becomes more difficult to alleviate through cultivation with increasing depth.

5.1.2 Prior to beginning work of the solar panel deployment and development of the associated infrastructure, a dense vegetated cover should be established to eliminate areas of bare soil. The seed mixes for this sward should be selected for zones of the Site with reference to the biodiversity management plan for the Solar PV site. As well as providing a physical protection of the soil surface from raindrop impact and vehicle/livestock traffic, the year round vegetated cover speeds drying of the soil following rainfall.

6 Elements of Development

6.1.1 The most extensive component of the development is the Solar PV panels on mounts over pasture. Mounts are secured by driving legs into the ground as simple piles.

6.1.2 The solar energy farm development will include compounds for substations, battery storage, switchgear housings and associated facilities, with access tracks.

6.1.3 Cabling for the development will be laid in trenches, both within and between the areas of solar PV. A perimeter security fence will also form part of the development. Cable trenches will be back filled with soil. Security fence posts will be set in concrete.

7 Soil Storage Bunds

7.1.1 The building and storage of soil storage bunds at the site should follow the guidance given in Sheets B and C of the Institute of Quarrying Good Practice Guide for Handling Soils in Mineral Workings. Soil stripping and storage will be mostly confined

to topsoil with very little excavation of subsoil. Where there is any requirement to store subsoil, this will be in bunds separate to the units of topsoil material.

7.1.2 Based upon the existing soils data from ALC survey with additional survey for the grid connection corridors, the separation of topsoil into separate units for stripping, storage and eventual restoration, will be determined by a suitably qualified Soil Scientist. A map of topsoil units will be prepared as a requirement of the SMP and retained to ensure topsoil units are restored to their original location. Mapped soil units will be taken from the ALC survey data for the Sites area. The resolution of ALC detailed field survey (one sample point per hectare) can be too low to adequately identify variation in soil characteristics for the narrow corridor of a grid connection trench. For this reason a dedicated soil survey of the Cable Route Corridor will be a requirement of the approved SMP.

7.1.3 The agreed SMP will require the recording of material source area, location and maximum dimensions of the soil storage bunds, creating a log of the volume of each soil unit stored.

8 Requirements

8.1 Supervision

8.1.1 Throughout the Construction and Decommissioning phases, regular inspections should be made by a suitably experienced soil scientist. Inspections will check for compliance with the agreed SMP, such as the depth of material stripped for areas of track, confirmation of soil handling and trafficking over land being stopped when soil has wetted to a plastic consistence, and condition of soil material in storage bunds.

8.1.2 Specific site inspections should take place prior to and post decommissioning work to identify any areas of specific remediation work required, and that any such remediation work has been completed successfully. An example would be looking for any areas of subsoil compaction that have developed where service vehicles have been used off the access track routes, specifying appropriate subsoil cultivation and assessing the effectiveness of that cultivation.

8.1.3 Periodic site inspection of the operating site can also be used in conjunction with the landowners, to identify any emerging issues such as loss of hardcore from access tracks to adjacent land or unnecessary vehicle movements off the access tracks.

8.2 Cable Route Corridors

8.2.1 A suitably experienced soil scientist should carry out a soil resource investigation of the cable route corridors ahead of construction work commencing to inform the specification for separation of soil horizons during excavation and backfilling, appropriate plant to minimise degradation of handled and trafficked soil, and plastic limits for suspension and recommencement of work following rainfall. As above,

the soil scientist should visit the working site and inspect the completed work to check for compliance and any emerging issues.

8.3 Switchgear Compound and Tracks

8.3.1 Topsoil should be stripped separately from the underlying subsoil to avoid the topsoil being covered by tracks, hardstanding and structures. For the access tracks the topsoil can be thinly spread to the side of the track from where it can be recovered when the track is decommissioned. For the larger switchgear compound the topsoil should be stored in a bund not exceeding 4m high.

8.3.2 Track and compound hardstanding surfaces should be laid over the subsoil with a separating geotextile membrane. Drains can be laid below the track and hard standing where appropriate, for instance if there is the need to intercept a spring line.

8.3.3 Topsoil should be stripped from the footprint of the switchgear and associated buildings and stored in a bund.

8.3.4 Where subsoil needs to be stripped to achieve a desired level, it should be handled and stored separately to topsoil in bunds of up to 5m height. Stripped subsoil can be used to build up levels within the site but should not be spread without topsoil having been stripped from the receiving area first.

8.3.5 Soil handling work should not commence until the soil has dried to below the plastic limit. Work should be suspended for rainfall. If the rainfall is sufficient to wet the soil at the surface to a plastic consistence, then work should not restart until it has dried sufficiently to return to a friable consistence.

8.4 Cable Trenches and Fence Posts

8.4.1 Excavation of cable trenches should separate topsoil and subsoil, and replace these in order when backfilling the trench. Where there is excess soil material to backfill, the level should be maintained by removing subsoil to storage and returning all of the topsoil. Cable trenches should be restored to their current ALC grades, as informed by the proposed detailed ALC survey of the cable corridor.

8.4.2 Where soil material is excavated for post holes, topsoil should be spread thinly to the side of the excavation, with subsoil removed to a storage bund or reused for building up levels.

8.4.3 Where horizontal directional drilling is used, soil survey will need to include the surface area occupied and excavated by construction plant. The subterranean route of directional digging work will not require soil survey as the zone of disturbance will be below that of crop rooting. Directional digging will also be confined to passing below existing buildings and infrastructure, and not used in preference to an excavated trench within a field.

8.5 Solar PV Rows

8.5.1 Prior to starting work a green cover should be established. Plant working on the site should be low ground pressure vehicles, for instance using agricultural tractors and trailers to move materials off the access track routes rather than road going HGVs.

8.5.2 Trafficking of plant and vehicles off the access tracks should not commence until the soil has dried to below the plastic limit. Work should be suspended for rainfall. If the rainfall is sufficient to wet the soil to a plastic consistence, then work should not restart until it has dried sufficiently to return to a friable consistence. Where wheel ruts or other signs of surface compaction do arise, these should be remediated by using an excavator to lift and loose tip the topsoil before reseeding. This should take place at the completion of the construction works once all plant and vehicle passes have been completed.

8.6 Operation

8.6.1 Little or no movement of soil material will occur during the operational life of the solar energy farm. Some maintenance activities may take place such as the replacement/resetting of a fence post. Where such activity does occur it should comply with the direction given in the construction and decommissioning guidance.

8.6.2 The grassed soil surface will be trafficked during the operational phase of the solar energy farm. Sheep or other small livestock will be used for intermittent grazing of the site and vehicles will be used on site for inspection and maintenance activities. As for construction and decommissioning, vehicles should avoid leaving the access tracks within the site while the soil surface is wet following rainfall.

8.6.3 Grazing livestock will be encouraged to move across the site to manage grass growth. The programme of movement should take into account areas of prolonged wetness following rainfall, prioritising grazing of these areas in summer rather than spring and autumn. Mobile feed and water troughs can be relocated to avoid loss of vegetation and build-up of compaction for the surrounding area.

8.6.4 It should be noted that the effects of vehicles and livestock in the operational site will be low compared to routine agricultural land management. The site will be managed as low input grassland and will carry less weight of stock than is standard for area fertilised field. Vehicles used within the site for inspection and maintenance will be considerably smaller and lighter than those used for arable cultivation where heavy ballast is required for tractors to be able to draw a plough.

8.6.5 Agreed soil management guidance for the operational phase of the development can agreed as part of the SMP alongside construction and decommissioning work, or embedded within the Operational Management Plan.

8.6.6 An extended period of time under grass is expected to result in a benefit to soil health, specifically soil organic matter (SOM), across the solar PV areas. There is little evidence available regarding any impact on soil health specific to solar panels over a 40-60 year timescale, however in comparison to the effect of reverting arable land

to grass, any detectable effect of solar panels is anticipated to be marginal. The detailed OEMP should set out a programme of soil health monitoring to be undertaken throughout the operation of the proposed development to understand the impact of solar development on soil health.

8.7 Decommissioning

8.7.1 As for the solar PV deployment, removal of the solar panels and associated facilities will involve trafficking of vehicles over the grassed soil surface. Such work should only take place when the topsoil is below (drier than) the plastic limit.

8.7.2 Following decommissioning, all agricultural land should be restored to its current ALC grades, as informed by the detailed ALC survey. Following removal of hard standing such as switchgear housings and access tracks, the newly exposed subsoil should be loosened then lightly consolidated by a toothed excavator bucket to a depth of 30cm prior to the replacement of topsoil. A grass cover should then be established and the land maintained under grass (grazed of mowed) for three years prior to any return to arable production. An aftercare period will not be necessary for the majority area where soil has remained in situ as the extended period of time under grass should leave the soil profile in better structural condition than that found under the current arable production. Any minor variability from the current ALC grading identified in post restoration surveys should be acknowledged and an assessment can be made as to whether this could be justified (on a case by case basis) as a result of difference of professional judgement. Natural England are confident that, if the measures prescribed in the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites and the Good Practice Guide for Handling Soils in Mineral Workings 2021 from the IoQ are followed, that successful restoration should be achieved.

8.7.3 On completion of decommissioning works the site should be inspected by a soil scientist to check for the presence of subsoil compaction, with particular focus on areas such as haul routes over in situ soil and the locations of livestock troughs and handling pens. The landowners should be encouraged to inspect the site themselves prior to the soil scientist visit to identify any areas where they have heightened concern.

8.7.4 Where problematic compaction is found the area should be subsoiled prior to any reestablishment of arable production.

8.7.5 As for the Operational Phase, the agreed soil management guidance for the decommissioning works can agreed as part of the SMP alongside construction activity, or embedded within a Decommissioning Plan.

9 Reference

Ref.1 Good Practice Guide for Handling Soils in Mineral Workings. The Institute of Quarrying, 2021. https://www.quarrying.org/soils-guidance