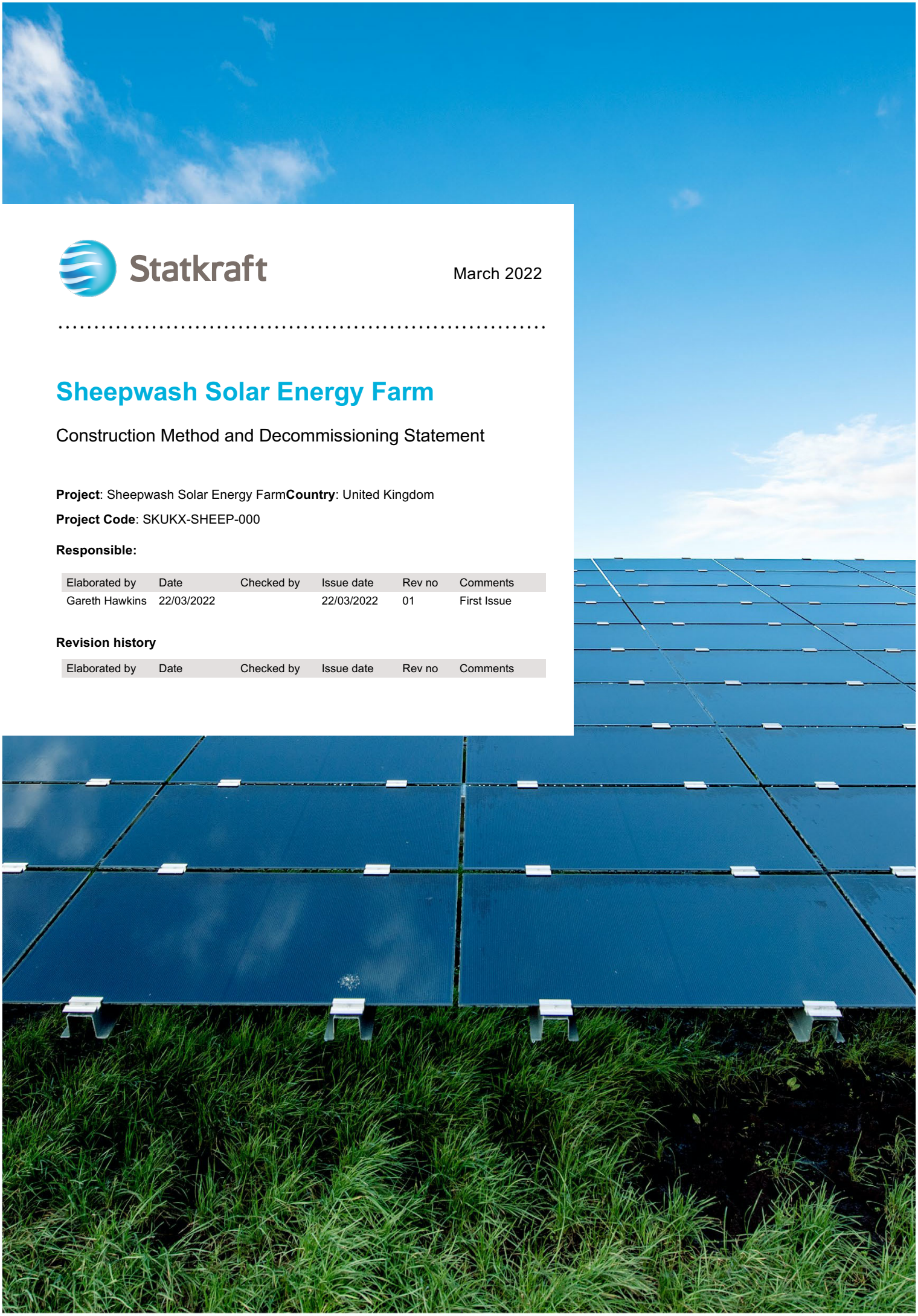

Statkraft

March 2022

Sheepwash Solar Energy Farm

Construction Method and Decommissioning Statement

Project: Sheepwash Solar Energy Farm**Country**: United Kingdom

Project Code: SKUKX-SHEEP-000

Responsible:

Elaborated by	Date	Checked by	Issue date	Rev no	Comments
Gareth Hawkins	22/03/2022		22/03/2022	01	First Issue

Revision history

Elaborated by	Date	Checked by	Issue date	Rev no	Comments

Contents

1 Introduction

This report describes how the construction/installation methods employed will mitigate potential effects on soils and agricultural land associated with the proposed construction of a solar energy farm with all associated works, equipment and necessary infrastructure.

The report describes how the construction/installation methods employed will mitigate potential effects on soils and agricultural land.

The methods employed in decommissioning the infrastructure at the end of the life cycle of the scheme are also described as well as proposed monitoring and remediation measures.

This report has been prepared by the applicant, Statkraft UK Ltd.

Statkraft are one of the largest renewable energy developers in Europe and therefore experienced in the technical aspects of the construction of renewable energy generation. Statkraft UK have been operating in the UK since 1998.

The development of the site in accordance with the methodology contained within this report will allow for continued productive agricultural (grazing) use during operation and will prevent any long-term adverse effects on soil quality after the operational lifetime of the scheme.

2 General Construction Principles to Limit Impacts on Soil and Land

The construction principles which will be deployed to limit impact on soil and land at both the construction and decommissioning phases are summarised below and detailed further within subsequent sections of this report.

- All operations will be undertaken strictly in accordance with the methodology described within this document and the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, DEFRA (2009).
- Operations will also be undertaken in accordance with the more detailed guidance but referencing the same techniques described in the recently published Good Practice Guide for Handling Soils in Minerals Workings, published by the Institute of Quarrying in July 2021 which provides enhanced clarity on appropriate soil handling for operators and regulators whilst referencing the same techniques as the guidance referenced above.
- All machinery plant movement/work will be undertaken from access tracks or temporary matting to prevent soil compaction.
- The construction work is largely low intensity and much of the installation of the solar energy farm will be undertaken by hand which further reduces the potential for soil compaction.
- All soil handling will be limited to dry conditions between the start of May and the end of October.
- Determining whether soils have an appropriate moisture content for handling will be checked by a simple ‘plasticity test’ involving obtaining material from the stockpile outer layer and core, and testing whether a 3 mm thick thread can be rolled in the palm of the hand. If not, the material is suitable for handling.
- Topsoil will be recovered and conserved from areas of temporary track, hard standing and structures such as switchgear housings. This material will be retained for respreading over the same area on decommissioning of the site. Only a limited volume of subsoil will need to be excavated at the site associated with the construction of cable trenches, post holes and the placement of transformer stations.

3 Construction Overview

The installation will include the following steps.

Site preparation	1. Management of existing ground conditions
	2. Laying access roads/temporary tracks
	3. Preparation of hard standings for construction compound
	4. Preparation of hard standings for battery storage/export substation
	5. Preparation of hard standings for substations/transformer stations
	6. Installation of perimeter fence
Solar array installation	7. Equipment delivery and distribution
	8. Installation of panel supports – pile driven or pre-cast ballast (concrete or other)
	9. Frame construction and panel mounting
Electrical infrastructure installation	10. Cabling
	11. Delivery and installation of substations and inverters
	12. CCTV installation
Completion works	13. Construction compound removal
	14. Temporary track removal
	15. Landscaping

Full details of how the installation steps will be conducted to mitigate damage to soil and land and allow reversion to agricultural use is provided in the following paragraphs.

The table below summarises the main built elements of the proposal.

Item	No.	Total Area
Temporary Compound	1	4000 m^2
Access roads		20400 m^2
Perimeter fence posts		4500 m
CCTV poles	30	
Panel framework – pile driven	1220 (30 x 2) and 104 (15 x 2)	
Cable trench		5200 m
Timber barn and compound	1	1116m^2
HV Compound	1	940m^2
Substations	16	576 m^2

3.1 Site Preparation

3.1.1 Management of existing ground conditions pre-installation

The existing ground conditions will be managed to ensure that a 'green cover' (a sward of grasses and other forage plants) will be established prior to the start of construction work.

Land in arable management will have a cover crop established in the autumn following the harvest of the last arable crop before installation work commences. This green cover will help 'armour' the soil surface against damage resulting from the installation activity as well as protecting the soil surface from rain/wind erosion and accelerating drying of the soil following rainfall. This green cover will also provide the crop for livestock to graze during the operation of the solar energy arm.

3.1.2 Laying access roads and temporary tracks

The access tracks are constructed from aggregates laid on a geotextile permeable separation layer and will be installed at the outset of construction.

Approximately 11357m2 of permanent access track will be installed which will remain in place for the operational lifetime of the scheme.

Approximately, 1200 m2 of temporary access tracks will be created to enable the construction process. These will be removed after installation is complete.

Use of low compaction track or tyre equipment for this aspect of the works will further minimise direct soil impacts. Where access is required to areas where no access tracks are proposed ground protection mats will be used. These mats will also be used in areas where stability is required for moving heavy equipment, such as the transformers and energy storage containers to prevent sinkage.

Topsoil will be stripped from track construction areas using the excavator/dumper truck method which avoids traffic on stripped surfaces (as described in the Construction Code of Practice for the Sustainable use of Soils on Construction Sites) to a standard depth of 300 mm.

The total topsoil stockpile volume generated by temporary access track stripping is estimated as 600 m3.

The topsoil removed will be spread to either side of the tracks to minimise the transportation of soil to bunds wherever possible.

Soil stripped in association with the permanent access tracks (approx. 10200 m3) will be seeded as per the Detailed Landscape Plan (Drawing No. AWO143-PL-002)) with grassland seed mix and kept weed free by cutting, to ensure topsoil is maintained in good condition. If any conflict is encountered in the areas where soil is to be spread with the tree planting elements of the planting scheme proposed then the topsoil involved will be stockpiled separately (to avoid mixing which could affect the land quality after restoration) and placed in stockpile bunds 3m high for reuse. Bund locations of the different topsoils will be recorded on a map.

The long-term soil storage bunds will be sown to a grassland seed mix and kept weed free by cutting, to ensure topsoil is maintained in good condition for restoration.

3.1.3 Preparation of hard standings for construction compound

The main construction compound is shown on Drawing 27899/150 Rev 0.

The only agricultural area to be utilised is a small area to be used for temporary parking and offloading totals approximately 4000 m2 (0.4 ha).

Topsoil will be stripped from the temporary parking/offloading area using the excavator/dump truck method (as described in the Construction Code of Practice for the Sustainable use of Soils on Construction Sites) to a standard depth of 300mm. Stripped topsoil will be placed in a temporary stockpile bund 3m high for reuse.

The area will be surfaced with imported aggregate, underlain by geotextile matting to ensure the aggregate can be fully removed during decommissioning.

3.1.4 Preparation of hard standings for energy storage

A timber barn and compound will be constructed in the south east of the site. The total area of the battery energy storage compound is approximately 1116m2.

The battery containers located in the compound and the PCS units located in the timber barn sit on concrete foundation pads with shallow foundations up to 0.35m above ground level.

Excavation works affecting subsoil are only required for the transformer which is installed on a concrete pad that requires excavation to a depth of approximately 1m (depending on ground conditions).

Topsoil stripped for stockpiling will total approximately 50m3. This topsoil will be placed in a long-term grassed stockpile no more than 3m in height.

3.1.5 Preparation of hard standings for substations/transformer substations

The development includes 18 substations within the solar array each comprising of switchgear and storage housed within a container and an external transformer. Each container measures 12.2m x 2.4m. The total land area covered by these substations is 267m2.

The storage containers are installed on shallow hardcore standings requiring minimal soil excavation. The transformer base is 2.6m x 2.95m and is installed on shallow concrete pads installed on a hardcore/aggregate base. The excavation depth for the hardcore base is approximately 0.5m depending on ground conditions.

Topsoil stripped from these areas will be placed in the main long-term stockpiles for replacement after decommissioning.

3.1.6 Installation of perimeter fence

Perimeter fencing will comprise post and wire 2.4m in height. This will be installed by a fencing contractor using standard installation equipment.

3.2 Solar Array Installation

3.2.1 Equipment delivery and distribution

Distribution of the solar panels, supports, string inverters and solar table components is by dual tyre low inflation pressure tractors and similar equipment and/or wide track vehicles. This equipment is similar to agricultural machinery used on arable farms and are specifically designed to ensure minimise soil compaction.

These vehicles will deliver equipment to on site localised distribution points along the access tracks, from which the equipment is then distributed by hand.

Due to the extent of the development and the large amount of equipment that will be handled, traffic within the site will be managed and controlled to avoid unnecessary distribution journeys. Where these journeys are made they will be within restricted zones to further reduce the likelihood of significant soil compaction.

3.2.2 Installation of panel supports

Most of the panels will be supported by fixed tilt steel framework elevations driven to 1.5 m depth by a small specialist pile driving device. The installation will involve about 18000 piles at an average density of approximately 1 pile per 30 m2. The pile-driving device has low ground pressure tracks but will operate only from access tracks and ground protection mats to prevent compaction.

3.2.3 Frame construction and panel mounting

Components (solar panels, supports, string inverters and solar tables) will be delivered by tractor and trailer to localised distribution points along the access tracks from where they will be distributed by hand.

3.3 Electrical Infrastructure Installation

3.3.1 Cabling

The majority of cabling is above-ground (mounted in strings beneath panels).

Buried cable installation is as shown in the table below.

Cable type	Number	Length (m)	Cable Depth (m)	Installation method
Medium voltage cables		5142 m	0.9	Trencher & trench roller
AC cables		18540 m	0.8	Trencher & trench roller
Earthing cables		6750 m	0.8	Slit trencher
CCTV power and data cables		5000 m	0.6	Slit trencher

Cables will be installed using trenching equipment – trencherer, trench roller and slit trencher. To minimise the requirement for trenching all cables will be housed in a single.

The maximum depth of the cable trench is 0.9m and width 0.6m. Excavated topsoil and subsoil will be separately stockpiled before replacement. Stockpiled subsoil will be placed on geotextile matting. Trenching operations will be undertaken during dry weather between May and October to avoid soil structural damage.

3.3.2 Delivery and installation of substations/inverters

Delivery and placement of heavy components will mainly be limited to the use of roadways and access tracks. Where delivery requires access to other areas, low pressure matting will be employed.

3.3.3 CCTV Installation

CCTV poles will be subject to a concrete base. A maximum of 30 poles will be installed at 2 metres inside the fence line.

3.4 Completion Works

3.4.1 Construction Compound Removal

The temporary car parking/unloading area will be decommissioned by excavating aggregate using an excavator/dump truck operating entirely from hard standing areas. Once geo-textile matting is removed stockpiled topsoil will be replaced and the area resown to agricultural grass. The area will either be used exclusively for cut grass or for very low-density stocking (e.g. for stock isolation) for a minimum of three years.

Any construction infrastructure will be decommissioned and removed from remaining hard standings.

3.4.2 Temporary track removal

Aggregate and matting will be removed by an excavator/dumper operating on the track surface to avoid any soil compaction.

Topsoil will be removed from stockpiles and replaced on the subsoil using excavator/dumper operating from track surface or low-pressure matting.

The affected areas will be loosened using a winged tine subsoiler.

3.4.3 Landscaping

Site topsoil to a depth of 150mm will be laid in all areas where new planting is proposed. These areas will be clean and decompacted with free-draining subsoil. In areas within Tree Protection Zones the existing topsoil will be retained and undisturbed.

All planting areas will then be cultivated (except within tree protection zones) to a depth of 300mm removing all stones over 50mm diameter.

50mm depth well-rotted approved organic compost, incorporating organic fertiliser will be added to the areas to be cultivated. Within tree protection zones cultivation shall be limited to site clearance, if required.

Plants will be individually pit planted with the pits dug by hand.

4 During Operation

The operational phase of the solar energy farm is a benign low impact activity with negligible impact on the quality of the underlying soil. The potential for compaction of the soils during the operational phase of the development is therefore very low. As a result, there will be a long-term benefit with regard to the fertility of the soils with the soils retaining nutrients and improvement to the organic matter within the topsoil.

Should excavation works be required then these works will be performed in accordance with the "Code of Practice for the Sustainable Use of Soils on Construction Sites."

5 Decommissioning and Reinstatement

When the operational phase ends, the solar energy farm will require decommissioning 37 years from the commencement of operation.

All solar array infrastructure including modules, mounting structures, cabling, inverters and transformers would be removed and recycled or disposed of in accordance with good practice. The future of the electrical compound including the substation and the energy storage facility would be discussed with the distribution network operator and agreed with the landowner and the local planning authority prior to commencement of decommissioning.

These works would be undertaken according to legislation, regulations and best practice that are current at the time of decommissioning. Subsequently, it may be necessary to review and update this outline document at the decommissioning stage.

A Decommissioning Environmental Management Plan (DEMP) and Decommissioning Traffic Management Plan (DTMP) will be prepared to ensure that decommissioning is undertaken in line with prevailing good practice at the time. The DEMP/DTMP will include similar measures to those included in the Construction Traffic Management Plan submitted with the Application, covering issues such as:

- Transportation methods;
- Pollution prevention; and
- Noise management.

In total, decommissioning is expected to take approximately 12 months, including the removal and disposal of all infrastructure associated with the solar energy farm and site restoration.

Some of the removal works are expected to occur concurrently to maximise efficiency and minimise time spent onsite.

Restoration of the site is anticipated to occur in tandem with the removal of structures.

Decommissioning will involve the following steps:

Solar array	1. Panel dismantling
	2. Panel support removal
Electrical infrastructure	3. Buried cable removal
	4. Substation and inverter removal
	5. CCTV infrastructure removal
Hard standings	6. Energy storage/substation compound removal
	7. Substations and inverters pad removal
Completion works	8. Access track removal
	9. Fencing removal
	10. Agricultural measures

5.1 Solar Array

5.1.1 Panel Dismantling

Components (solar panels, supports, string inverters and solar tables) will be dismantled by hand and collected by tractor and trailer to be removed from site and recycled.

5.1.2 Panel support removal

Steel piles will be removed using a specialist small piling rig operating in reverse. The rig will operate from access tracks or matting, avoiding operating on the soil surface. Materials will be collected by tractor and trailer to be removed from site and recycled.

Ballast supports will be lifted by mobile crane. Materials will collected by tractor and trailer to be removed from site and recycled.

5.2 Electrical infrastructure

5.2.1 Buried Cable Removal

Buried cables will be removed using tracked excavator and cable plough. Topsoil and subsoil will be stripped and placed separately in temporary stockpiles. Stockpiled subsoil will be placed on geotextile matting. Trenching operations will be undertaken during dry weather between May and October to avoid soil structural damage. All materials will be collected by tractor and trailer to be removed from site and recycled.

5.2.2 Removal of substations/inverters

Collection and removal of heavy components will mainly be limited to the use of roadways and access tracks. Where delivery requires access to other areas, low pressure matting will be employed.

5.2.3 CCTV infrastructure removal

CCTV pole concrete footings will be removed.

5.3 Hardstandings

5.3.1 Energy storage/substation compound removal

The future of the electrical compound (including the energy storage facility and substation) will be discussed with the distribution network operator and agreed with the landowner and LPA prior to commencement of decommissioning.

5.3.2 Removal of substations/inverter pads

Collection and removal of heavy components will mainly be limited to the use of roadways and access tracks. Where delivery requires access to other areas, low pressure matting will be employed.

5.4 Completion Works

5.4.1 Removal of access tracks

Aggregate and matting will be stripped by an excavator/dumper operating on the track surface to avoid any soil compaction. All materials will be removed from site and recycled.

Topsoil will be removed from stockpiles and replaced on the subsoil using excavator/dumper from matting.

The restored areas will be sown to an agricultural grass seed mix. If appropriate the affected areas will be loosened using a winged tine subsoiler under dry summer conditions to remove any areas of minor compaction.

5.4.2 Removal of fencing

Post and wire fencing can be easily removed and recycled, unless their retention is viewed as advantageous for agricultural use.

5.4.3 Agricultural Measures

Once all equipment has been removed the fields will be mown and areas of disturbed ground tillaged and prepared for seeding. The areas will be inspected by an agricultural consultant. Areas of the land that are identified as requiring further works to improve the soil structure and or quality will be identified and these works performed.

6 Monitoring and Remediation

Monitoring and remediation of two complete growing seasons will be implemented following the date upon which the agricultural land is first planted post decommissioning of the solar energy farm.

On site monitoring will be undertaken at least three times during the growing season (Spring, Summer, Autumn). Monitoring will identify any remaining impacts directly associated with the construction and operation of the project. The following is expected to be recorded from onsite inspections:

- topsoil thickness and trench settling;
- excessive Rock (>4-inches);
- soil compaction;
- drainage.

An annual report on the above will include date stamped photographs illustrating crop growth in the restored agricultural area. These findings will be compared the productivity of the nearest adjacent undisturbed agricultural land of similar crop type within the same field. If a decline in crop productivity are determined to be to the development of the land as a solar energy farm, appropriate remediation measures will be implemented.