Mallard Pass
Solar Farm

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Environmental Statement Volume 2 Appendix 12.8: Land Use and Soils - Construction Methodology

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Appendix 12.8 - Construction Methodology (in so far as it affects soils)

Construction Methodology

12.1.1. The potential likely stages of construction of the PV Arrays are described below. Whilst there may be slightly variations to this methodology, it is considered sufficiently robust to form the basis of assessment in this ES. These are:

- mark-out and lay-out legs for Mounting Structures;
- piling-in of legs of Mounting Structures;
- bolting together of Mounting Structures;
- bolting-on of PV Modules;
- cabling and trenching.

12.1.2. The machinery likely to be used includes:

- agricultural loadall;
- tractor and trailer;
- pile driver with rubber tracks;
- standard 360° excavator on tracks with generally small buckets.

12.1.3. PV Arrays are installed rapidly. The process involves marking out the grid on the grass and laying out the steel stanchions. This stage is non-instrusive. It does involve machinery carrying the legs, however, the distribution of legs and PV Modules will generally be avoided when soils are saturated and therefore most susceptible to damage. As set out in the outline Soil Management Plan (oSMP) [**EN010127/APP/7.12**], this will vary depending upon the soil type. In a normal year this will limit machinery activity on the lighter soil types (Elmton 1 and Elmton 3, Sherborne) between mid-December and mid-March, and on the wetter soil types (Denchworth, Fladbury) between mid-November and

early/mid-April. Typically a tractor and farm trailer are used to transport the legs to the fields, then each leg is lifted off by hand.

12.1.4. Alternatively, the machinery used will also involve an agricultural loadall or, as per the example below, a smaller loadall in this case with tracks to spread the weight.

Loadall Delivering Legs

12.1.5. A team then arrives to knock the stanchions / legs in. From operations we have observed it takes a little over a minute per pole to knock the pole into the ground and move the machine to the next pole[1]. This operation is shown in the photograph below. This was inserting legs into a clay soil, but the deep stoneless soil at the Order limits will be similar.

[1] This observation was made on clay soils at the Purton Solar Farm, Wiltshire, in 2015. Ground conditions will inevitably affect installation speed.

Inserting a Stanchion

12.1.6. Typically, there will will be two or more teams working simultaneously, as shown below.

Team Installing Panels

12.1.7. The details vary slightly between panel manufacturers, but the Mounting Structures (for Fixed South Facing) will have a taller and shorter stanchion, as shown below. The lack of damage or disturbance to the grassland and ground conditions from this operation is evident in this photograph.

Stanchions Inserted (example in Wiltshire)

12.1.8. Leg designs vary. A pile of legs is shown below, and the cross section can be seen below and in the ground.

Framework Example

12.1.9. The next task is to construct the Mounting Structure, which is bolted onto the legs. This does not affect the soil. A loadall machine carries in the subframe and so as long as ground conditions are suitable there is no damage. The assembly team then lift the frame off the loadall and assemble the Mounting Structure by hand. There are many different designs. The first design, as preresented below (Bentham Farm, Wiltshire) is a design not intended for grazing as the panels are too low. The second is an installation at Manor

Farm, Lanvapley[2] which enables grazing as animals can easliy walk under the PV Modules.

Constructing the Mounting Structure (Bentham Farm, Wiltshire)

[2] The Manor Farm project was installed in 2016. The author undertook a site visit in April 2022 to investigate the current conditions of the site and how the land is being farmed during the operational phase of the solar farm development.

The Frames as Manor Farm, Llanvapley

12.1.10. The PV Modules are then attached to the Mounting Structure to form the PV Table. This stage is also non-intrusive to the ground and the only impact is from vehicular access, carrying in the panels. It can be seen that if ground conditions are suitable, there is no damage. The photograph below simply shows bruised grass from the passage of vehicles.

PV Arrays Added

12.1.11. The cabling along the length of the PV Tables is hung underneath the PV Modules (out of the reach of sheep) and then, at the end of a row, it goes underground, as shown below.

Cabling Along Panels


12.1.12. It is necessary to connect electric cables between the PV Tables and to run the cables back to the Solar Station. This involves trenches, dug with a machine. Immediately after digging these look disruptive to the soil, but they are installed in a similar way to field drainage pipes. Typically topsoil and subsoil are separated, as below.

Cabling Channels


12.1.13. The installation of cables is one of the few operations that involves digging whereby the soil structure could potentially be affected. The trenches are always narrow, but soil is required to be dug up to install the cable, as is

typical of the burying of services (water, oil, gas, telecomms) undertaken in England for many years. In areas where there is a clear subsoil and topsoil distinction, the topsoil should be placed on one side of the trench, and the subsoil on the other. Then once the cable has been laid the subsoil can be added back first, with the topsoil added second, to reinstate the soil structure to its original order and state.

12.1.14. That means that soils are restored and settle within days, and return to grass growth rapidly.

The Area Two Weeks Later After the Installation of Cables

This photo was taken 14 days after the trench was first dug.

12.1.15. This particular PV Array is set with the lower edge low to the ground, and so the site is not grazed. The photo shows that there is no evidence of differentiated forage growth over the trench.

The Area Five Years After the Installation of Cables

12.1.16. The cable route between the PV Tables and the Solar Station is indistinguishable at the Llanvapley site, as shown below. The site is grazed by sheep.

Buried Cables, Monmouthshire

12.1.17. With a poorly informed machinery operator, this stage of installation can be undertalken incorrectly. Topsoils and subsoils can get mixed, meaning that the topsoils can get placed at the bottom of the trench and subsoils at the top.

Properly informed and supervised, through the Soils Management Plan which will be secured via DCO Requirement, incorrect installation will be avoided. .

12.1.18. Critically, however, trenching activities would not cause ALC downgrading of the soil. The trench is typcially circa 30 - 50cm wide, and even if the excavator operator made a critical error (which is unlikely, as this would be supervised), the mixing of subsoils and topsoils from the trench to the surrounding land, thus rectifying (largely) the error, would be possible after just a few passes with a plough or set of disc cultivators. A narrow slit of soil of different texture would not result in ALC downgrading.

Soil Damage from Inserting Legs and Construction Panels

12.1.19. Soil damage should be limited if good practice is followed and as secured through the Soils Management Plan. The soils are clayey, and therefore sticky when wet but hard and easily trafficked when dry. The installation of legs involves small machinery. The example above involved a pile driver without a cab, at approximately two tonnes. A three tonne cabbed version is shown below, acommpanied by workes. This can be compared to a modern tractor, with a person in the cab (also shown below).

Three Tonne Cabbed Pile Driver and Modern Tractor

12.1.20. Machines of the tractor size (as shown above) are typical of working farmland. The photos below, whilst poor, show potatoes being planted in Monmouthshire in May 2022, and a large tractor photographed in the Lincolnshire fens in May 2022.

Planting Potatoes as an Example of Tractor Scale during Typical Operations

12.1.21. In case the scale of the tracked vehicle is not obvious by comparison, below is a photo of a similar scale tractor passing a small car.

Scale of Tracked Vehicle

12.1.22. Soil will not be damaged during the installation of legs, as the machinery used will be lightweight compared to modern farm machinery.

12.1.23. If soil was damaged, it can easily be rectified. Soil is frequently affected by agricultural practices, which involve more intensive interference with soil than solar installation. For example the photo below shows a maize harvest and a photo of soil affected by wheelings during manure spreading. Both show typical agricultural practice. Neither practice results in long term damage to soil.

Mazie Harvest (Library Photo) and Field Affected by Wheelings During Manure Spreading

12.1.24. To remdiate any issues, running a tractor down between the rows of PV Tables with a subsoiler or tines would be possible, to loosen and restore any compaction.

12.1.25. Equipment within the Solar Stations will stand on concrete pads or concrete columns, and surrounded by permeable hardstanding. The topsoil is stripped off these areas at construction phase and is stored long-term for reinstatement at decommissioning, as described below.

Solar Stations at Llanvapley

12.1.26. The access tracks are created by removing the topsoil and then adding stone to the surface.

12.1.27. All these areas can be restored by removing the stone, decompacting the subsoil with agricultural machinery, and replacing the topsoil, in accordance with the Soils Management Plan. The land will then be returned to a similar condition to the condition before construction commennced.

12.1.28. The soil will be stored in low mounds for reuse at the decommissioning stage, as shown below.

Low Mounds

12.1.29. The construction compound will typically use mats to dissapate weight during use, to avoid impacts to soil.