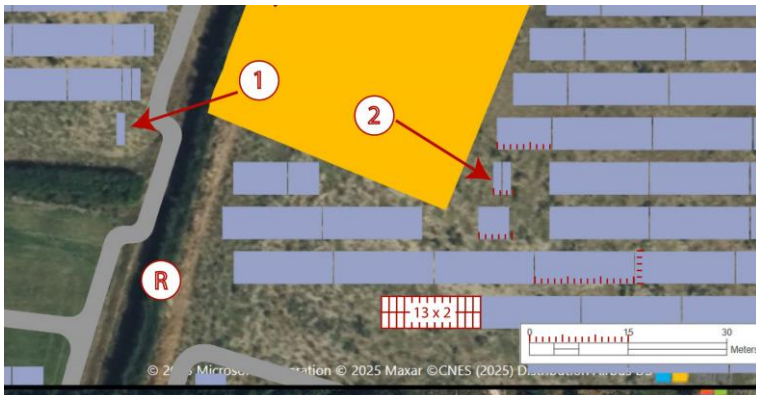
D1 Submission: Design Concerns.

Panels and Tables.

According to Table 6.3 of ES Project Description the scheme will have between 1,800,000 and 2,200,000 PV panels. This is somewhat lower than the range previously anticipated in the Scoping Report (Table 6.1) at 2,500,000 to 2,800,000. As a provisional Illustrative Masterplan has now been drawn up, what is the Masterplan panel count?

Zooming in on the Masterplan confirms that a 'standard' table comprises 26 PV panels in portrait configuration (13 × 2) as described in the Scoping Report. (Project Description omits the standard table.) This is consistent with the dimensions of the Longi LR5-72HGD panel (2278 × 1134mm) specified in Table 14.7 of ES Climate Change.



Most of the layout uses this standard table, but the Masterplan raises some questions:

1) There are many ultra-short tables (e.g. 1 and 2 in the diagram). The Scoping Report gave a minimum table length of 14m. Project Description reduced this to 3m. Table 1 looks like a single panel width: 1m.

A brief survey on Google Satellite suggests that no tables on UK farms are less than 8m. Are these ultra-short tables drawn in error, or is PVDP pushing the envelope on table design?

2) The Masterplan also shows the network of roads (R) than run around the perimeters and across the fields. These are coloured grey here but are described as 'grass with occasional matting' or 'natural ground surface' [OOMP, p6]. Are these sufficient to support the weight of emergency fire tenders year-round? Has Oxfordshire Fire and Rescue been consulted? The roads look a bit narrow for the job (2.5m), and the turn radii are certainly far too tight to be negotiated by a fire tender. Should some panels be removed to relax the radii?

How will a replacement PCS be delivered to its location? These are the size of a standard trailer unit [Project Description,Table 6.3]. An articulated lorry plus crane would be unable to reach their destination on BWSF's internal roadways.

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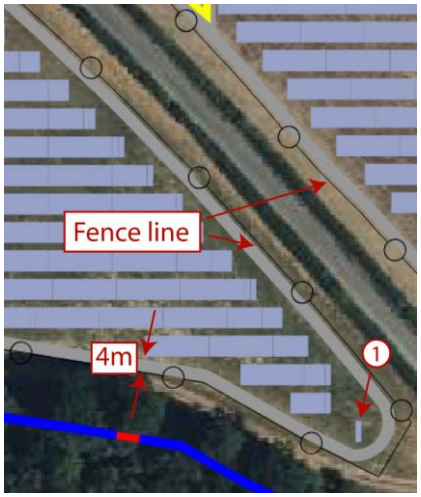
3) The north-south table gap is specified in Project Description as between 1.5m and 3.0m; the gaps measured on the Masterplan are 1.5m (panel:gap ratio 3:1).
This is considerably narrower than the 4.0m gap that one sees typically in the UK. At lower latitudes tight spacing might be acceptable, but up here at 52°N the sun never gets very high: tight spacing will result in excessive energy loss for much of the day due to self-shading (shadow from the adjacent row of panels to the south).

A solar farm in nearby Didcot uses a panel:gap ratio of less than 1:1. (51°38'08"N 1°21'13"W)

4) Similarly, Table 6.3 of Project Description specifies a minimum distance of 7m between the fencing and the solar tables, whereas the Illustrative Masterplan shows PV panels consistently packed in with a fence separation of less than 5m.



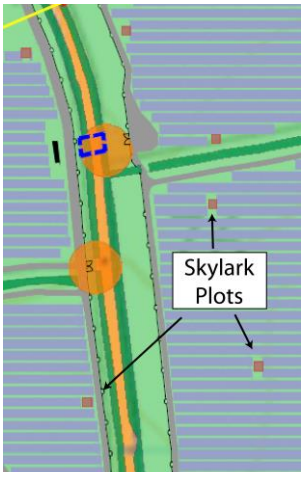
Is this an interim layout subject to revision upon further critical review?

5) Longi supplies the LR5-72HGD at power ratings between 560W and 590W.

This should not be confused with a car manufacturer offering a range of engine options. Longi manufactures the LR5-72HGD; variation in manufacturing tolerance results in spectrum of performance rolling off the production line. Whilst PVDP should be applauded for committing to the premium product (like all other NSIP applications), this is not a credible scenario. We cannot rely on all the other solar farm constructors settling for the budget end variants.

For the purpose of planning, does it make more sense to calculate performance and CO_2 emission data based on a mid-range variant, such as 575W?

Skylark Plots.



An appealing feature on the Illustrative Masterplan is the inclusion of Skylark Plots, shown as brown squares, within the solar arrays. These are described in section 11.6 of Outline Landscape and Ecology, and broadly follow the guidance in the government's set-aside compensation scheme AB4: Skylark Plots. ("Unsown plot" in 11.6.3 presumably means an area not 'sown' with solar panels.)

AB4 concerns the planting of winter crops, such as slow-growing wheat cultivars, which provide the ideal habitat in spring for skylark nesting sites. AB4 requires the plots to be at least 50m from the field boundary, as skylarks keep well clear of hedgerows and other land features that may expose them to predation.

The Landscape language is similar to that of AB4, with the exception that PVDP calls these 'foraging areas' rather than the nesting sites intended by AB4. The 50m rule is not observed in the Masterplan drawings.

After drilling, the plots can be managed with the same treatments as the remainder of the field. There is no need to keep the plots weed-free but spot-treating with herbicide in April will help skylarks to access their nesting sites. *AB4: Skylark Plots (gov.uk)*
After drilling, the plots can be managed with the same treatments as the remainder of the field. There is no need to keep the plots weed-free but spot-treating with herbicide in April will help skylarks to access foraging areas. *Outline Landscape and Ecology Management Plan*

("Drilling" refers to the farming mechanism used for seed sowing.)

It is difficult to accept that skylarks will be attracted to a small plot of land bordered by seven-foot-high glass/metal reflective 'hedgerows,' either for nesting or foraging. And, where will our skylarks be nesting once their current sites [ES Appendix 9.9] have been eliminated?

Should the ExA consult RSPB or Natural England to confirm that this is a "widely used mitigation strategy for developments" such as solar farms [11.6.2]? The hasty application of copy–paste suggests that this may not be the author's area of expertise.

Decommissioning Solar PVs

After nuclear power, utility-scale solar poses the worst end-of-life disposal challenge.[1]

PVDP's strategy for decommissioning Botley West will be found in the Decommissioning Plan (DP), the Decommissioning Traffic Management Plan (DTMP) and the Decommissioning Waste Management Plan (DWMP). These do not exist at present. They will be written prior to decommissioning, but their likely content is considered in the Outline Decommissioning Plan. Paragraph 1.2.3 outlines what might be expected in the DP, which is 'secured' in the DCO. The DTMP is similarly secured [1.2.1].[2]

PVDP aims to dispose of PV panels by employing best practice and sending panels to an authorised reprocessor in accordance with Best Available Treatment, Recovery and Recycling Techniques.[3] It will use the 'proximity principle' to avoid long-distance transportation.

This is probably not acceptable for the purpose of a DCO.

There is no authorised reprocessor for utility-scale solar, and there is no prospect of one in the foreseeable future. Panels are sent to landfill because the technology does not exist to recycle on anything approaching a commercially viable basis. Sadly, virgin glass is just too cheap (as well as having the superior purity required for, say, solar panel manufacture).

The Inspectorate would not look favourably on a nuclear power proposal that overcame the contaminated waste issue by predicting a scientific breakthrough in nuclear half-life prior to decommissioning. Solar PV proposals should attract the same scrutiny. We all pray for a miracle breakthrough in reprocessing methodology, but a DCO application must work with what there is, not what we keenly wish there was.
Botley West is ultimately a landfill project.

Two million panels at 30kg each is 60,000 tons, and if all panels are replaced at least once by year 26, that's at least 120,000 tons in PV waste alone. This is more than enough to qualify for a new landfill site, particularly as current UK sites are struggling to meet demand. Where will the panels end up?

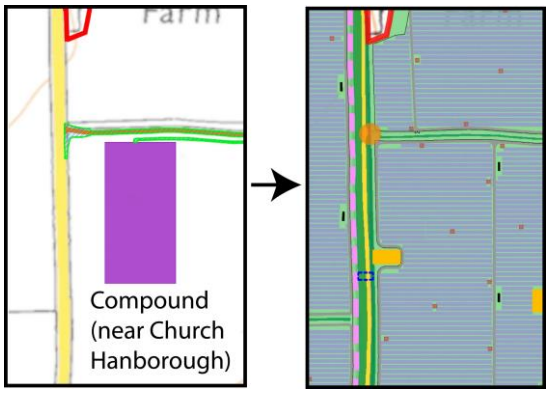
As PVDP is guided by the 'proximity principal,' does it anticipate a Bladon LPA application by year 25, or should a Blenheim Estate Landfill Project be included as associated development in the DCO? Has consideration been given to the construction of an on-site chemical processing facility to remove the toxic elements (cadmium, lead, mercury) prior to burial?[4]

[1] In fairness to nuclear, an 840 MWe nuclear plant generates 15 times as much energy over its lifetime as an 840 MW solar plant, so the award of 'worst' might be open to challenge.
[2] It isn't. And it is not obvious how much security there is in a DP that hasn't been written.
[3] BATRRT is a 2006 DEFRA directive for WEEE. It does not address PV panels.
[4] Curiously, NPS EN-3 states "Solar panels can be decommissioned relatively easily and cheaply." [2.10.68]

Decommissioning Logistics

There will need to be decommissioning compounds to accommodate all the HGVs, plant, office space, solar panels, etc, both at end-of-life and at the replacement stage (by year 26). Where will these compounds be located? Lanpro has overlooked this requirement.

Following construction, each compound will (somehow) have been replaced with a grass field and PV panels (ca. 2800). You can send bulldozers into a grass field, but not into a field of panels, tables and piles. Assuming the decommissioning compounds will be located at the original sites, where will all the plant and piles of PV be based while the compounds are being restored? There is no set-aside open space in the vicinity. It's all PV.



For obvious reasons, the logistics of this are even more challenging when year-25 replacement is attempted. At ISH1, the solicitor clarified that replacement is both happening (PV lifespan assumption) and not happening (PVDP anticipation).

Decommissioning Fund

There is no statement in the Outline Plan or elsewhere about how the decommissioning process will be funded – whether for recycling or landfill. It must be speculated that the operator will divert profits to a reserve account over the farm's twilight years.

This would be placing an extraordinary amount of faith in a future undertaker. It is also possible – indeed, likely – that SolarFive's bank account will be depleted by end of operations, and that the company will simply file for liquidation. If dwindling profits result in premature closure, this becomes a racing certainty. In any event, the local councils (i.e. ratepayers) will presumably pick up the substantial bill.

The responsible measure would be to lodge a decommissioning bond with DESNZ prior to operation, just as for a nuclear plant. If the ExA agrees, the bond should be secured in the DCO, and PVDP should propose and justify its monetary value at examination.

Lanpro deserves some credit for its contribution to this Outline Plan. Lanpro Services Ltd wrote the West Burton Decommissioning Plan, from which 90% of the text has been lifted verbatim. Noteworthy exceptions are the BATRRT embellishment; paragraph 2.1.4, which is an accidental duplication from 2.1.2; and the opening sentence of Table 3.1, which now features dual font-size and is grammatical nonsense. The single largest change is the addition of a weighty preface admonishing "no part of this report should be reproduced." This is irony on steroids.

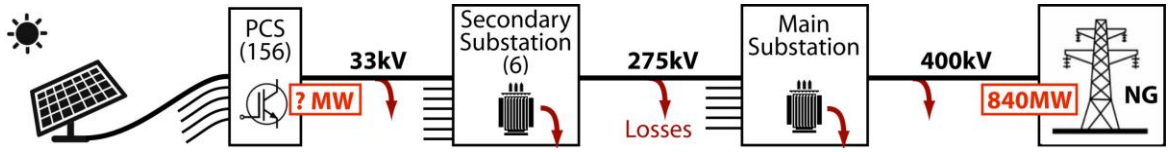
AC Cable Power Specification

At ISH1, the ExA enquired about the ability of the ac cabling to handle increased power following a possible year-25 upgrade of the PV panels/PCSs. Replacing the ac cables as well would obviously not be desirable.

It can be misleading to think of these cables as a having a maximum rating like domestic wiring. HV cables are not subjected to anything close to a level of current that risks, for example, fire or melting insulation. Rather, there is a trade-off between cable cost and energy loss. (An electricity generator is paid for its energy not its power.)

The question might have been expressed better as:

1) Based on the 33kV/275kV/400kV cable specifications, what is the cumulative loss of power in the ac cabling when the array is supplying 840 MW at the NG substation (expressed as % of PCS output power)?
2) If the panels/PCSs were upgraded (and assuming NG was able to accept the higher power), what would the loss be if 1200 MW was being supplied?



The % loss in the ac cables is unlikely to increase noticeably with a PV/PCS upgrade.

However, transformers *are* a limiting factor if power is increased. These do have maximum power ratings (strictly, *apparent power* rather than real power, because of the reactive component of the load). Because of their significant unit cost, it is unlikely that PVDP will have overspec'd the transformers, unless a future power upgrade is confidently anticipated.

[An "840 MW" solar farm has a mean (average) power output of 95 MW,[5] so the cables are rarely under any stress at all – and only to a limited extent for a few midday hours in late June if there is no cloud.]

I got a grade B at Physics A Level, so the ExA should not have too much regard for my 'expertise.' Advice from a professional Electrical Engineer, though, is highly recommended.

If the ExA is exploring electrical aspects of this design, it might look into the unusually close separation of the tables, with their consequently very low tilt (15°) to mitigate self-shading. Although not an overriding consideration, optimum tilt at Oxford for yield-per-panel is at least 40°. (Look at any UK solar farm photo.) Close separation, on the other hand, is key to obtaining the highest possible installed capacity (MWp).

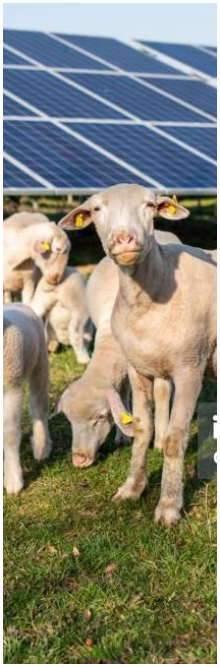
Installed capacity is just about the only solar parameter found in EN-3. An ExA that has assertive regard for NPS directives will be minimally distracted by technical nuance or GCSE Physics (e.g. East Yorkshire). In the absence of inquisitorial expertise, the applicants' performance data are, in practice, always taken on trust.

[5] Load Factor 11.5% (DUKES)

D1 Submission: More Concerns.

There are aspects of the BWSF proposal that raise concerns about the on-going viability of the project and the potentially catastrophic financial risk that PVDP is taking.

Sheep



Like all solar websites, BWSF has a picture of sheep. Unlike many proposals, PVDP does not have a credible plan to manage the grass in its solar panel fields.

Grazing has been successful on small projects, typically an established sheep farm where a proportion of the land is now shared with solar panels. One example is Fenton Home Farm near Haverfordwest.[1] The owners (and their dogs) have learned new skills, and the flock had to be replaced with a smaller breed (Aberfield) to fit under the panels, at a density of 12 per hectare in the summer and 5 in winter.

One NSIP farm is showing promise with agri-solar: the Great North Road Solar and Biodiversity Park (800 MW + BESS, Newark-on-Trent), which is at the pre-application stage. Elements Green has teamed up with RSPB and other wildlife trusts; two local sheep farmers are engaged at the design stage and will manage 9000 sheep on the solar fields.[2]

BWSF

PVDP's strategy is thin on detail: "conservation grazing"[3] at up to six sheep per hectare in the months of March and April, then August to November (damp ground permitting) [OLEMP, Table 11.1, and elsewhere].

The annualised density of sheep is a fraction of that at Fenton Home Farm, casting doubt on the adequacy to control sward growth. There is no plan to plumb in (essential) water troughs, and the wall-to-wall PV precludes rounding-up areas for veterinary and other husbandry purposes. It is not obvious that HGV livestock transporters could even reach most of the fields, and the 0.8m lower edge of the solar panels rules out typical farm breeds.

[1] Farmers Weekly article (2022): https://www.fwi.co.uk/livestock/how-solar-panel-diversification-is-working-for-a-sheep-enterprise (accessed 02/06/25). Warning: you get to read it once, then you have to sign up.
[2] https://www.solarpowerportal.co.uk/agrivoltaics-deal-to-bring-9000-sheep-to-1gw-solar-park/ (accessed 02.06.25)
[3] = "grazing"

If PVDP knows of a shepherd with a flock of diminutive sheep and a mobile water-dispensing business who is prepared to supply, remove, supply again and remove 5000 animals[4] annually in the back of a Landrover to PVDP's unworkable schedule, a timely submission of support is encouraged.

Sheep are not the problem. The problem is Plan B.

Sheep certainly have a photo-op role to play in public relations – and possibly even a role in the opaque GHG and biodiversity calculations (?)

In the real world, for large-scale solar on prime agricultural land, operators invariably invest in a fuel bowser and some grass-cutting tractors. And, for BWSF, that is a problem.

The solar PV tables are so tightly packed in (1.5m north-south separation) that a tractor will not fit between adjacent table rows. Will PVDP be resorting to garden lawnmowers and strimmers?

This does not appear to have been thought through adequately.

Security

According to Project Description [Table 6.4], there will be 14 infrared security cameras: two for each of the seven substation. The cameras will have emergency lighting [really?]
There will be manual lighting and PIR motion sensor security lighting for the PV arrays and transformers [=substations?].
There will be manual lighting and PIR motion sensor security lighting for the electrical compounds [=substations?]

In contrast, OOMP [2.8.3] says that the boundary of the site will have CCTV. Presumably 'CCTV' means the same infrared cameras (?) How many? A thousand? (The boundary fencing is 100 km long.)
The substations will be monitored remotely [2.2.3]. Where? By whom? Why are the boundary CCTVs not also being monitored?
The section concludes with a bucket of optional extras, including remote monitoring [which they already have] and a loudspeaker announcing "Police On Way" [2.8.7].[5]

At the heart of BWSF's security strategy lies the Risk Management Threat Assessment with its Security Risk Rating as determined by a Suitably Qualified and Experienced Person (SQEP), with security reviews at "identified times associated with the rating" [2.8.2].

SQEP registers are for professionals such as nuclear engineers and front-line airforce personnel. What is the recognised 'qualification' for a Threat Assessment SQEP? Where is the register of accredited members?

This security proposal is just techno-babble. If wholesale plagiarism is your design methodology, you should, at the very least, ponder the text that you are copying.

[4] 6 per ha × 838 ha
[5] They aren't. They get far too many false automated calls as it is.

2.8 Security

2.8.1 The Sites will receive several security risk management threat assessments during the development, construction, operation, and ultimately decommissioning phases. These security risk management threat assessments are conducted by suitable qualified and experienced persons (SQEP) and will determine security risks.

2.8.2 The Applicant recognises, and embraces, the symbiotic relationship between safety and security. The security arrangements to be present at the Site will therefore contribute to the overall safety of all who will, or may, enter the Site. The security arrangements will be SQEP reviewed at identified epochs commensurate to the Security Risk rating and will further assess any changes in the Security Risk Management Threat Assessment.

2.8.3 The boundary of the Sites will be secured both by fencing and by the provision of Closed-Circuit Television (CCTV) equipment. Cameras would be placed on galvanised steel painted green poles with a maximum height of 3m.

Perimeter fencing will be deer wire mesh and wooden post fencing with a maximum height of 2.5m. All new access tracks will be secured by gates, which will be set back from the public highway. Where existing access tracks are used that also provide access to residential properties, appropriate security measures will be put in place in consultation with the relevant property owner(s).

2.8.4 There will be palisade fencing around the substations and energy storage compound which will have a maximum height of 2.6m.

2.8.5 Other potential security measures to be included comprise:

- Detection systems such as beam break, image detection etc. to raise alarm when fence breached;
- Audio announcement when intruder detected to warn alarm triggered and police on way;
- Barriers/locked gates at main entrances to the Sites;
- Steel doors on substation buildings;
- Buried cables as much as possible;
- Remote monitoring; and
- Alarm response contract with keyholder/security company.

2.8 Security

2.8.1 The Sites will receive several security risk management threat assessments during the operation and maintenance phase. These security risk management threat assessments are to be procured by the Applicant and conducted by suitable qualified and experienced persons (SQEP) and will determine security risks.

2.8.2 The security arrangements to be present at the Site will contribute to the overall safety of all entering the Site. The security arrangements will be SQEP reviewed at identified times associated with Security Risk rating and will further assess any changes in the Security Risk Management Threat Assessment.

2.8.3 The boundaries of the Sites will be secured both by fencing and by the provision of Closed-Circuit Television (CCTV) equipment. Cameras would be placed on galvanised steel painted green poles with a maximum height of 3m.

2.8.4 Perimeter fencing used will comprise deer wire mesh and wooden post fencing with a maximum height of 2.1m. All new access tracks will be secured by gates, which will be set back from the public highway. Where existing access tracks are used that also provide access to residential properties, appropriate security measures will be put in place in consultation with the relevant property owner(s).

2.8.5 Palisade fencing will be installed around the substations which will have with a maximum height of 2.6m.

2.8.6 Fencing associated with the Project would be regularly inspected during the operation and maintenance phase, and repaired as required.

2.8.7 Other potential security measures to be **included** in the Project **include**:

- Detection systems such as beam break, image detection etc. to raise alarm when fence breached;
- Audio announcement when intruder detected to warn alarm triggered and police on way;
- Barriers/locked gates at main entrances to the Sites;
- Steel doors on substation buildings;
- Buried cables as much as possible;
- Remote monitoring; and
- Alarm response contract with keyholder/security company.

"No part of this report should be reproduced" [**rps** Preface]. Sound advice.

Cable theft from solar farms is a UK growth industry – 750 km of dc cable in nine months of last year[6] – with international export now outperforming scrappage as the preferred downstream logistics. The NSIP solar field is a wet dream for copper recycling entrepreneurs: far from sight, no time pressure, no dangerous voltages (at night) and an inexhaustible supply of dc cable. BWSF will be hosting 3000 tons of copper in its dc cables [GHG Calc, Table 14.1]. This market sector is certain to mushroom as NSIP solar matures.

Cottam won its DCO, but the ultimate owner will pay dearly for this woefully inadequate security strategy. PVDP must do better. It should have come up with a coherent answer to the security dilemma. Adding a sentence about fixing a fence was not that answer.

PVDP should have consulted the experts: SEROCU (our regional organised crime div.) and security companies that specialise in on-site protection for large-area complexes. They know what needs to be designed into a sterile perimeter, appropriate surveillance measures and a robust ongoing security protocol.

Risk Management Threat Assessment is what you do *before* project design kicks off.

Facilities and Staff

The BWSF proposal is innovative – revolutionary, even – in its lack of buildings [Masterplan] and the complete absence of parking [OOMP, 2.6.1] or regular staff [2.4.1].

Typically, an operations building in an NSIP-scale solar farm would presumably have warehousing for its inventory of replacement PV panels, inverters, CCTV cameras, lighting, cabling, fencing, etc as well as workshops, garaging for survey vehicles, tractors and related maintenance equipment, a CCTV monitoring room, an IT hub for production logging and fault identification/isolation,[7] admin and a comfort/rest area and kitchenette for staff. Externally there would be diesel storage and parking for 20 cars with goods-inward access.

PVDP has not mentioned its PV panel-cleaning plan. As tractors will not fit between tables, is PVDP falling back on buckets and manual methods, as used for roof-top and small-scale solar?

Sunnica proposed a fulltime staff of up to 17 in three shifts, supplemented during periods of maintenance and panel cleaning [2.1.3].

The ExA would benefit from some insight into how the three-site BWSF complex could survive for more than a month without any of the usual facilities or staff – or sheep.

[6] https://electricalreview.co.uk/2024/12/04/solar-farms-report-unprecedented-surge-in-cable-thefts/ (accessed 02.06.25)

[7] Also pyranometers and fibreoptic cable in Works No 4; what is all this for?