

# STATEMENT OF APPLICABLE DESIGN CONSTRAINTS AND OBJECTIVES AFFECTING THE ARRANGEMENT AND INSTALLATION OF THE ARRAYS OF LILFORD HALL SOLAR FARM

## 1.0 Introduction

1.1 The solar farm at Lilford Hall has been constructed in accordance with planning permission in application NE/22/01456/FUL1 subject to the request for a variation of condition.

1.2 Specific panel height information is not directly referred to in the Planning Approval but rather in the Delegated Report.

1.3 The Delegated Report at Paragraph 2.2 specifies the following requirements for solar PV panels in the following terms.

*“The solar panels would be aligned east to west across the site, facing south to maximise solar gain. There would be a gap of approximately 3-4 metres between each row. The panels would be mounted on a frame, to be installed using spiked foundations of 1-2 metres deep. Each set of panels would be approximately 4.5 metres wide and stand to a maximum height above ground level of around 90cm at the southern edge and around 1.7 metres at the northern edge. The panels will be orientated at 22 degrees.”*

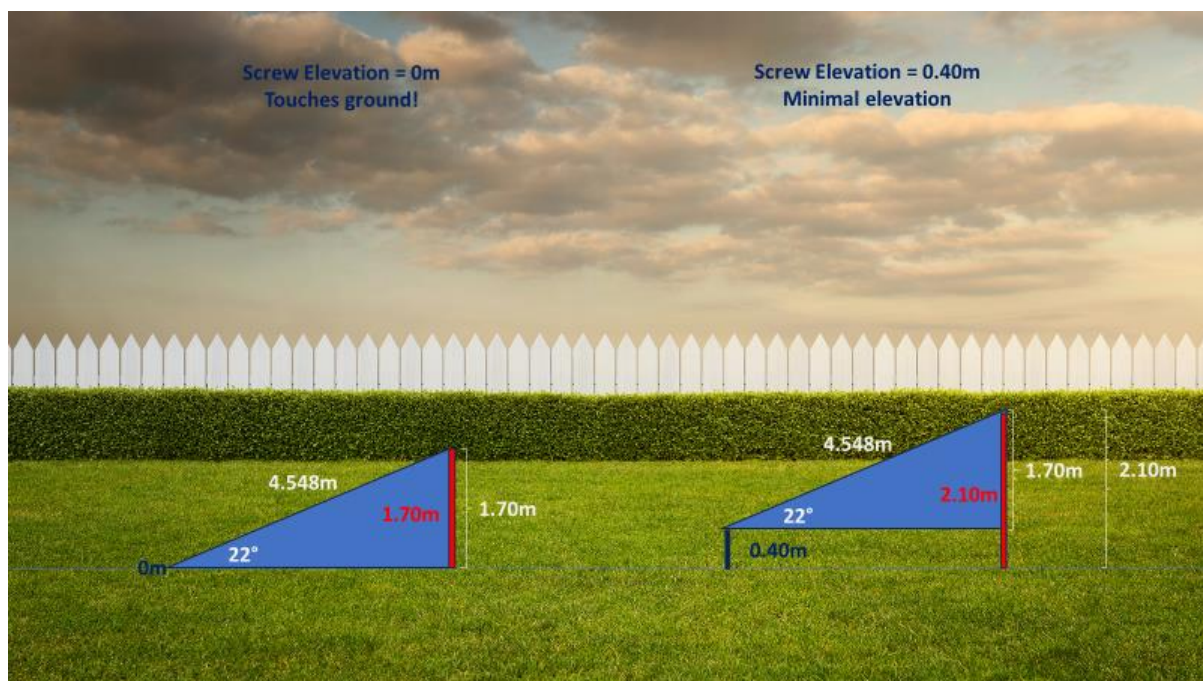


Figure 1: Panel Heights in Conformity with Paragraph 2.2 of the Delegated Report

1.4 This paragraph contains the following key technical information regardless of context:

- The panels should face south;
- They are about 4.548m long;
- They recline to an angle of 22° to the horizontal plane;
- The south side edge should be supported by a screw, with the edge no more than 0.9 metres above the ground.

1.5 The above information is sufficient to define the elevation of the panels from the ground as the height of the Northern edge.

1.6 The Northern edge is determined by the height of the Southern edge as shown in Figure 1 below as follows: if the Southern edge is at zero metres from the ground, the rules of trigonometry require that the Southern edge must be at 1.7m (i.e.,  $4.548\text{m} \times \sin(22^\circ) = 1.70\text{m}$ ).

- If the Southern edge is at 0.40m, the Northern edge must be at 2.1m (i.e.,  $1.70\text{m} + 0.40\text{m}$ ).
- From a practical perspective, it appears to be implied that these measurements would be relevant to the height of the ground before the land was scraped in preparation, which removed some 10cm - 15cm of topsoil.
- Further, it is necessary to leave a space of at least 30-40 cm under the southern edge to allow for the cutting of the grass and the maintenance of the site.

1.7 To ensure the horizontal installation of the panel edges on the undulating and sloping terrain, it is necessary to install screws at different elevations to accommodate this requirement. To illustrate, let us consider a lateral slope that spans 100 metres and descends by 5 metres. In such a scenario, there should be a difference of 0.50 metres in screw penetration between the highest and lowest points within a 10-metre array.

## 2.0 Information for the Planning Approval

2.1 The Planning Approval document itself does not refer to the height of the panels directly, but the height referred to in the delegated report is shown diagrammatically in DETAIL\_2022-12-13 INCL ELEVATIONS, submitted 13 December 2022, Planning Application NE/22/01456/FUL, which is one of the submitted documents as shown in the Figure 2 below.

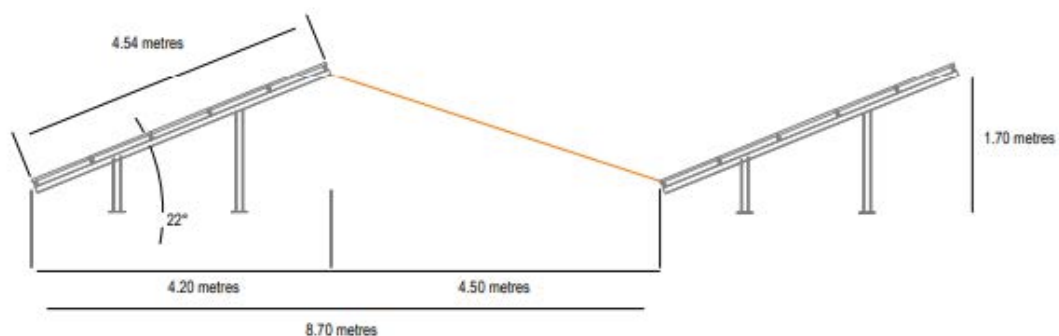


Figure 2: LILFORD PV DETAIL\_2022-12-13 INCL ELEVATIONS, submitted 13 December 2022, Planning Application NE/22/01456/FUL

2.2 This stylistic representation shows panels eerily floating in space. In this figure, proportions and shapes of the downward struts show that the height of 1.7m is with reference to the upper connecting flanges. This value, as explained above, is consistent with the invariant geometry of the mounting system.

2.3 These flanges, which connect to the tops of ground screws, are ~10cm – 15cm lower horizontally than the Southern edge of the panels as can be seen in the picture below, which shows the real mounting systems used and which are mounted upon ground screws.

2.4 For an indication of scale, a typical ground screw can be seen in the picture below with a partly panelled frame in the background



*Figure 3: A Ground Screw Shown for Scale with Panel Arrays in the Background*

2.5 A slight modification to Figure 2 above to include and reflect the distance from the Northern edge of the panel to the ground is shown in Figure 4 below. Here, the effect of the height allowance between panel edges and ground can be seen more readily.

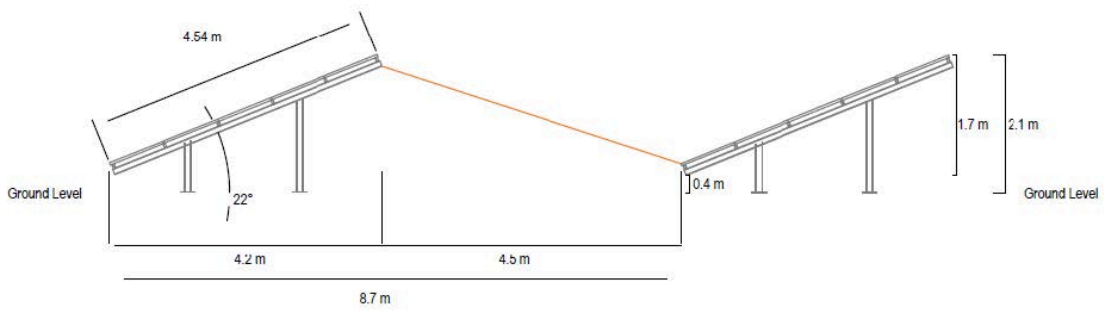


Figure 4: LILFORD PV DETAIL\_2022-12-13 INCL ELEVATIONS, submitted 13 December 2022, Planning Application NE/22/01456/FUL Modified to Include Typical Heights from Ground

2.6 Both the rules of trigonometry and the illustration provided in the planning submissions require that 1.7m is a fixed attribute of the mounting system relevant only to the minimum vertical height of the north edge from the ground.



Figure 5: Top view of an array of panels installed at the Lilford Hall site



*Figure 6: View of the light-collecting underside face of an array of panels installed at the Lilford Hall site*



*Figure 7: View of the solar farm at the Lilford Hall site displaying variation in ground level with panel consistency*

### **3.0 Conclusion**

3.1 The variation sought is for the general height of the arrays at the point from which the land beneath the arrays falls away to be at, or around, 2.10m (1.70m + 0.40m as described above), after allowing for the fact of the removal of some 10-15cm of topsoil around the screws.

3.2 The only exception to the arrangement of the arrays as constructed is where the alignment of the array over the site has required a marginal adjustment to be made in order to accommodate the topography, minimise the disturbance to the site and achieve a visually consistent arrangement of the arrays as referred to in the images within.