Design and Access Statement for Construction and operation of a solar farm with all associated works, equipment, necessary infrastructure and biodiversity net gains.

Land at Land West of A4074, to the North-West of Nuneham Courteney, South Oxfordshire

On behalf of RES Ltd.

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Document Management.

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Contents.

1. INTRODUCTION

1.1. This Design and Access Statement (DAS) has been prepared by Pegasus Group on behalf of RES Ltd (The 'Applicant') to support a full planning application for a solar farm with associated equipment and infrastructure on Land West of A4074, to the North-West of Nuneham Courteney, South Oxfordshire.

1.2. The application seeks full Planning Permission for ground-mounted solar photovoltaic (PV) development with the following description of development:

"Construction and operation of a solar farm with all associated works, equipment, necessary infrastructure and biodiversity net gains – know as 'Nuneham Solar Farm'."

1.3. The Proposed Development would have an export capacity of 49.9MW and will provide a reliable source of clean renewable energy. The main element of the Proposed Development comprises the construction, operation, management and decommissioning of a grid connected solar farm with associated infrastructure. Planning permission is sought for a temporary period of 40 years from the date of first export of electricity from the site.

1.4. The purpose of this document is to demonstrate that the Applicant has fully considered the design and access issues as part of the comprehensive preparation of the scheme prior to the submission of the planning application. This report therefore covers the following matters.

- Use;
- Amount;
- Layout;
- Scale;
- Landscape;
- Appearance; and
- Access.

1.5. This Statement will detail the process behind the design and indicate how through good design, the proposals can be delivered in a sustainable manner to meet local and national objectives of climate change, energy security, biodiversity enhancement, and a prosperous rural economy.

1.6. Whilst the DAS is set out to be read as a standalone document, it should be read in conjunction with the entire application submission in order to fully understand the Proposed Development, its potential impacts and planning merits. The accompanying Planning Statement sets out the planning policy context relevant to the design and access issues of this application's proposal.

1.7. The purpose of the Proposed Development is to support resiliency and sustainability objectives at both the local and national level. The National Planning Policy Framework (NPPF), National Planning Practice Guidance (NPPG), and the Suth Oxfordshire Local Plan in principle support the delivery of renewable energy infrastructure. NPPF Section 14 sets out how the planning system should support a transition to a low carbon future in a changing climate and states that Local Planning Authorities (LPA's) should approve applications for renewable energy and low carbon development if the impacts are (or can be made) acceptable. For further information please see the accompanying Planning Statement.

2. APPLICATION SITE AND CONTEXT

2.1. The site is located approximately 550m to the north of Nuneham Courtenay. The River Thames is located approximately 400m to the west of the site. The site is illustrated in the 'Location Plan' (refer to Image 1 – Site Location Plan and Context Plan below).

Image 1 - Site Location Plan

2.2. The site has been assessed for its suitability and has available grid capacity with a connection proposed immediately adjacent to the site to the existing 132kV grid infrastructure. Furthermore, it is considered that the site is suitable for renewable energy development following initial feasibility works with an engaged landowner.

2.3. There are no designated assets located within the proposed site boundary, however the northern boundary of the proposed development site abuts the identified southern boundary of the Scheduled Monument of Romano-British pottery site, prehistoric ring-ditches and enclosures, including medieval ridge and furrow.

2.4. Located approx. 220m northwest of the site boundary are two grade II listed Lower Farmhouse and Lower Farmhouse Barn Range approximately 20 metres to the east of the Farmhouse. Located 400m to the south of the site boundary is the Conservation Area of Nuneham Courtenay, a Conservation Area which contains 25 grade II listed buildings and 700m south of the southern boundary of the proposed development is the grade I Registered Park and Garden of Nuneham Courtenay which contains a large number of listed buildings including the grade I and scheduled Carfax Conduit, the grade I Nuneham Courtenay and the grade II* Church of All Saints.

2.5. Land to the west of the site is located in Flood Zone 3, an area at highest risk of flooding owing to the close proximity of the River Thames. The site is however, located in Flood Zone 1 in its entirety and is therefore at lowest risk of flooding.

2.6. Further details of the Application Site including the planning policy context are contained within the Planning Statement which accompanies this submission to South Oxfordshire District Council.

3. DESIGN

3.1. A considerable number of factors have contributed towards the design and layout of the Solar Farm that is proposed in this application. These are now discussed against the various aspects of design highlighted within the former CABE's guidance document regarding the production of Design and Access Statements.

3.2. An important factor in finalising the proposals has been consultation with the community and local stakeholders. This process is summarised in the accompanying Statement of Community Involvement.

Layout

Scheme Evolution

3.3. A thorough constraints analysis was undertaken to inform the final scheme.

3.4. In proposing the general layout of the development, great consideration was given to the retention of the established field boundaries on site along with planting of native hedgerows and trees. This helps to ensure that the development is well contained both physically and visually. In addition, a number of other constraints were considered, and appropriate offsets applied where necessary. The initial constraints mapping and subsequent design amendment works are shown on the below plan extracts. The constraints and their consideration as part of the design scheme are as follows:

Constraint		Consideration as Part of Design
1	Site Access	Within the site, existing field entrances have been used for internal access tracks. Where necessary, field entrances may require marginal widening to accommodate construction vehicles. The access strategy has been developed with the transport engineers, ecologist and arboricultural surveyors who ensured that all impacts on the existing hedgerows and trees were minimised. Appropriate passing for vehicles during construction on the initial access from the A4074 has also been accounted for within the design.
2	Trees and Hedgerows	A tree survey has been undertaken on the site and appropriate root protection zones have been accounted for within the scheme. Appropriate offsets have been given to hedgerow protection and ecological enhancements incorporated with the finalised scheme.
4	Public Rights of Way	There is a Public Right of Way (Footpath Ref: 317/5/20) that crosses the site from the northwest to south west. Appropriate buffers have been applied to the Public Rights of Way in order to protect and enhance public access and amenity.

Constraint		Consideration as Part of Design
5	Agricultural Land Classification	The site has been subject to a formal agricultural land classification. As a result of this survey an area to the south-east of the site has been removed as this constituted Grade 2 best and most versatile land. Furthermore, the northern boundary has been reduced to limit the amount of Grade 3a land included in the site. It is acknowledged that there is still a small section of Grade 2 and 3a within the red line boundary, this has occurred following the use of existing field boundary extents as the definitive boundaries.
6	Surface Water Drainage	It is acknowledged that there are areas of the site susceptible to surface water flooding. All infrastructure (inverters and the proposed substation) have been located outside if these boundaries. Where necessary floor levels have been raised.
7	Existing Ecological Features	A number of existing ecological features have been identified on the site. An appropriate buffer from these features has been applied as part of the design.
8	Noise	A Noise Impact Assessment has been undertaken, the results of which are detailed within the submitted report and summarised within the Planning Statement. The locations of the inverters and associated ancillary equipment have been strategically located away from residential receptors and it is considered that there will be no adverse impacts as a result of this scheme.
9	Archaeology	As part of the iterative process a geophysical survey was undertaken on the site. The survey identified a dense concentration of archaeological features. The red line boundary was therefore realigned to preserve these findings in situ.

Final Scheme

3.5. The finals scheme as submitted is detailed on the Infrastructure Layout (Figure 4 – Drawing Number 04531-RES-LAY-DR-PT-003 Rev 5). The submitted plan outlines the positions of all infrastructure within the site and accompanying drawings set out their dimensions.

3.6. A network of internal tracks around the solar panels will be laid to allow vehicle access to the supporting equipment (mainly inverters and the substation) to allow for maintenance. Access tracks will be kept to a minimum around the site and will be 4.5m wide and made of gravel over a crushed rock capping although these details are to be confirmed during the detailed design. The layout and extent of the roads is limited to that necessary to provide access and maximises efficiency.

3.7. The associated equipment siting has also considered the impact on the appearance of the area and adjustments have been made to sensitively site equipment away from the boundaries of the fields, ensuring that there is separation from the existing vegetation and any sensitive ecological features. The existing and proposed mitigation planting will contribute towards visual screening of the site.

3.8. The main changes between the earlier iterations of the scheme and the final scheme can be summarised as primarily being the deletion from the scheme of an area of Grade 2 best and most versatile land and the removal of an area of identified archaeological sensitivity.

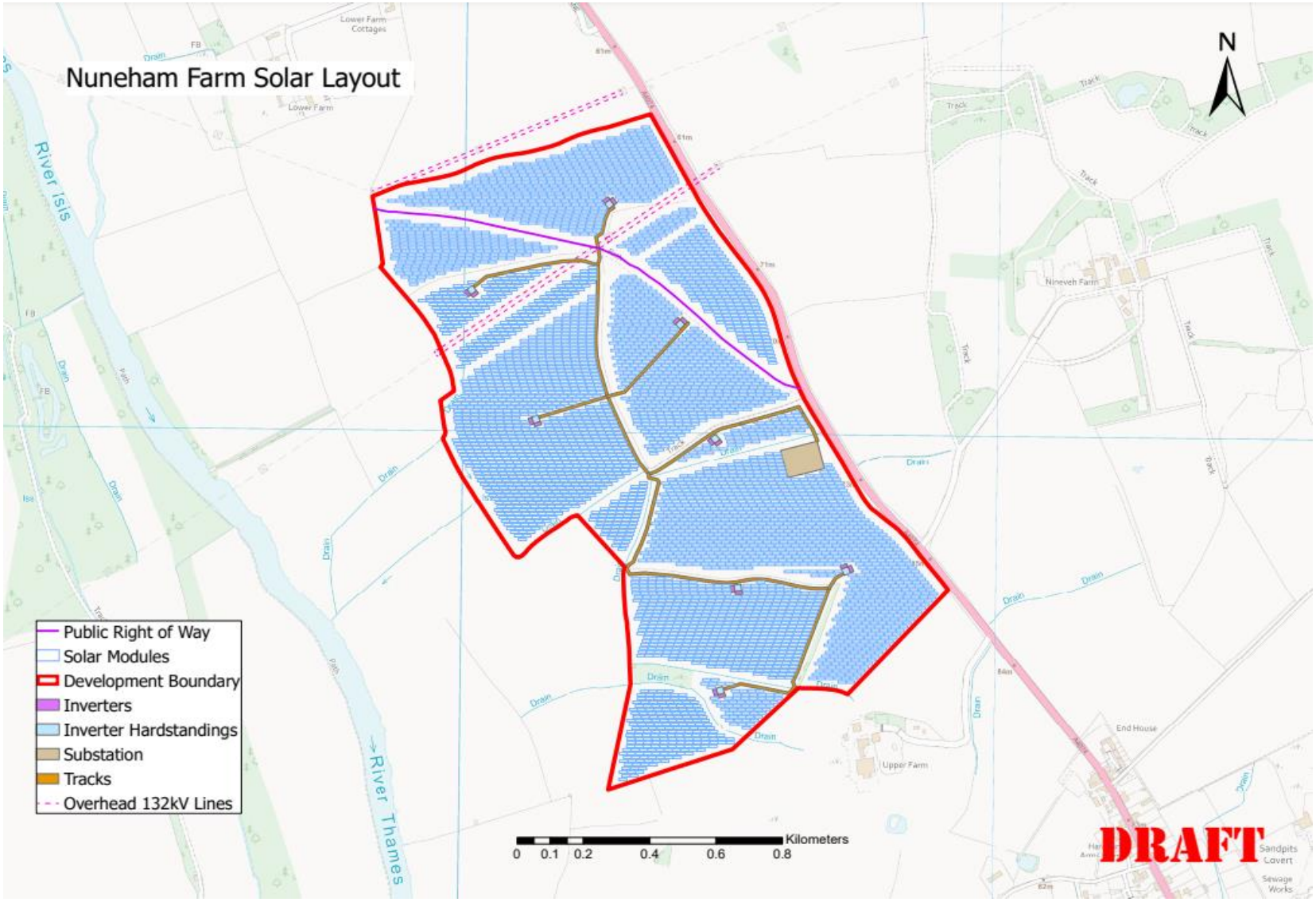

Image 2 – Preliminary Design Shown at Public Exhibition

Image 3 – Initial Constraints Mapping – Post Public Exhibition

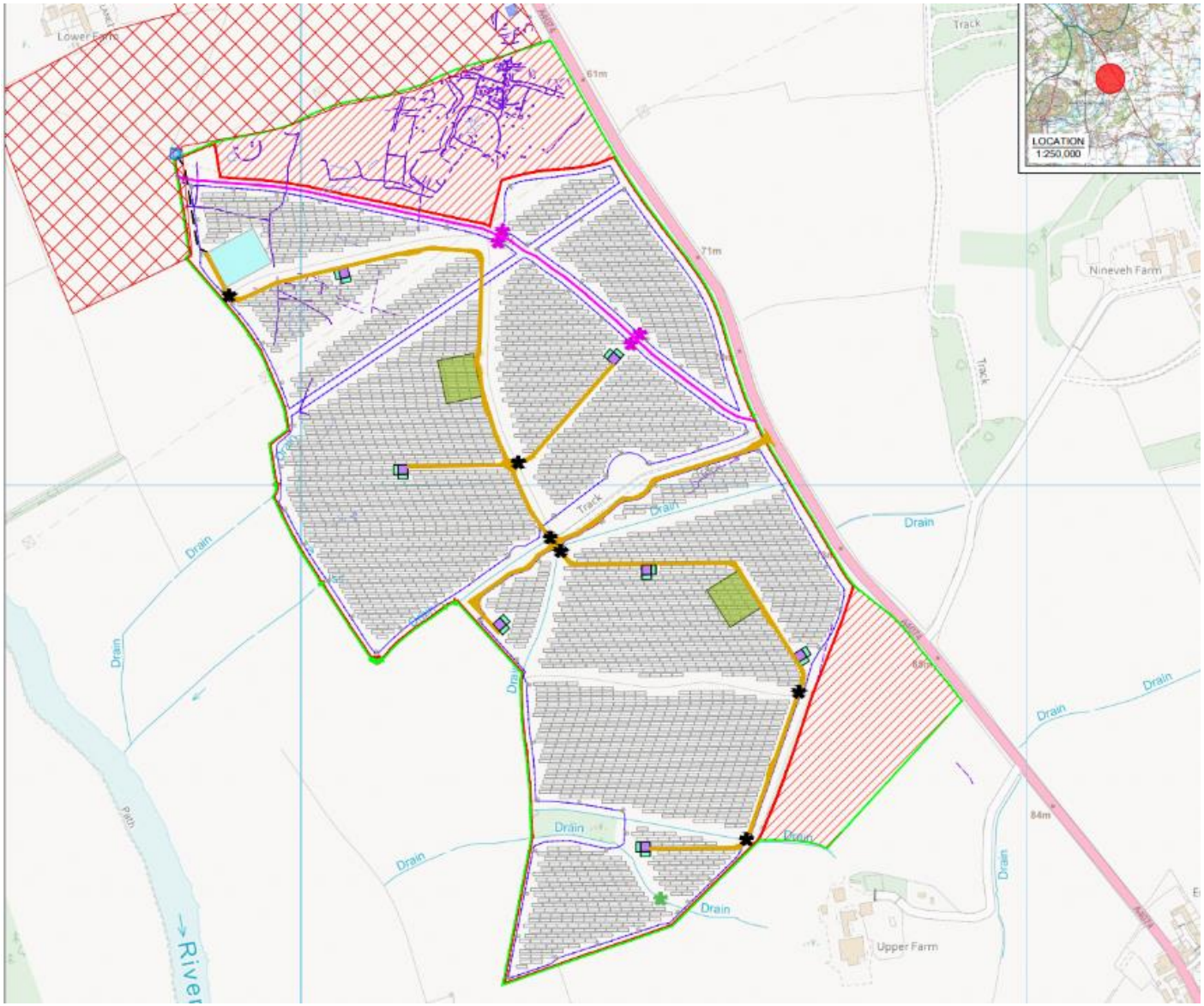

Image 4 – Design Chill Accounting for Constraints

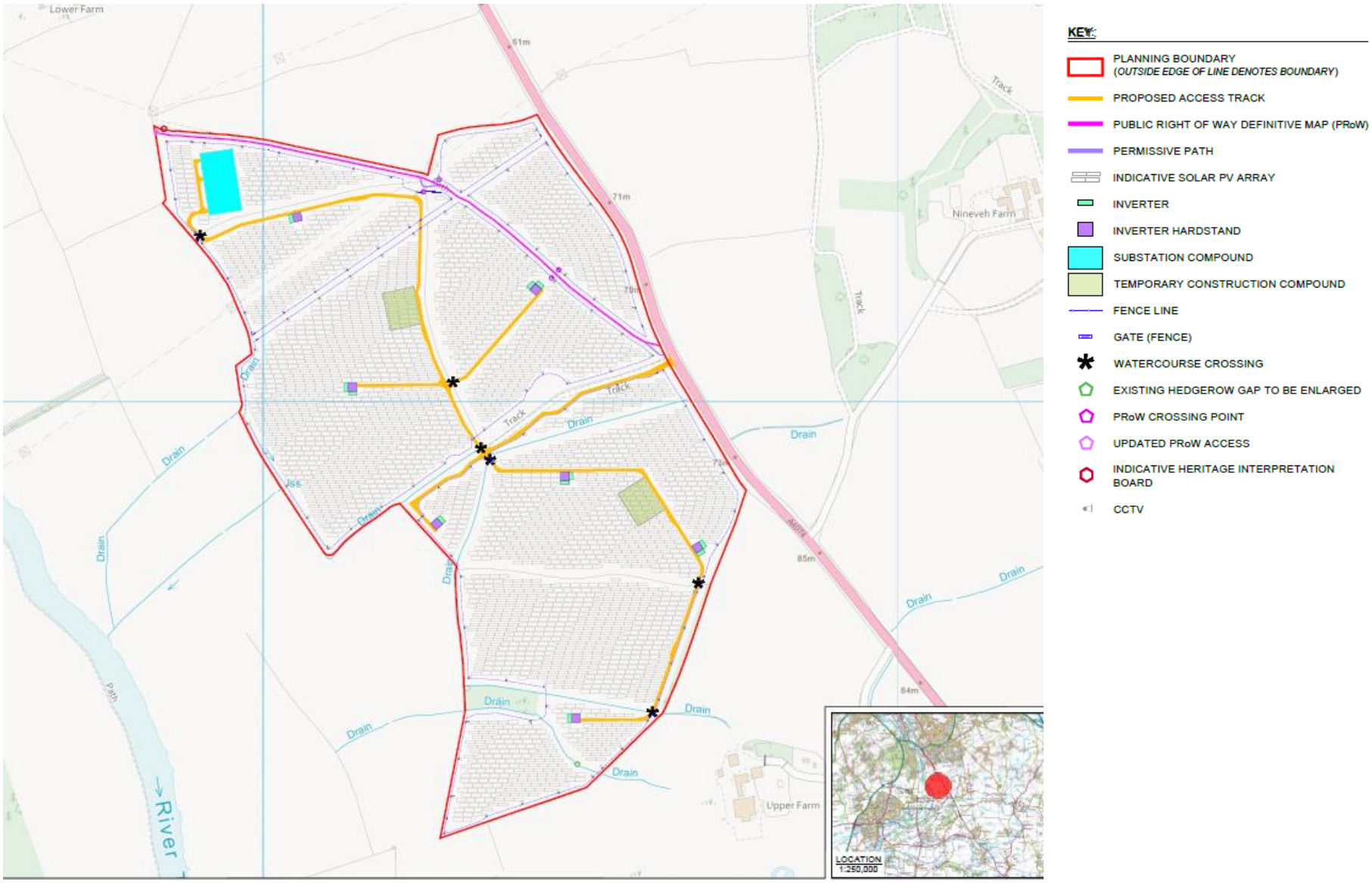

Image 5 – Final Submitted Scheme

Scale

3.9. The scale of the development on site has been determined by the equipment necessary to efficiently and viably generate renewable energy. All of the plant buildings on site will be at or below single storey level (i.e approximately at or below 3m in height). Further details of the individual components which make up the scheme, including their proposed size and scale are set out on the submitted plans When viewed from nearby public vantage points, the scale of development will not be overbearing due to its limited height and relatively benign appearance (i.e lack of movement and external illumination).

3.10. Each array of panels within the field will be mounted on a simple metal framework and have a maximum height of no more than 3.6m above existing ground level. The main purpose of the mounting structure is to hold the modules in the required position without undue stress. It is capable of withstanding appropriate environmental stresses for the location, such as wind or snow loading.

3.11. The proposed ancillary buildings are designed to be as small as possible while still being capable of undertaking their required electrical function within the site. Such structures will not be prominent within the surroundings and will be smaller than many isolated stores and barns typically found in the countryside environment.

Biodiversity

3.12. The Environmental Enhancement Strategy sets out a number of biodiversity enhancements throughout the site. Habitat creation and enhancement measures within the site include:

3.13. The supporting Ecological Appraisal outlines the biodiversity net gains that can be achieved on site. The delivered net gain is significantly more than the required net gain of 10%. The total number of biodiversity units in the proposed layout post development are 85 units of area habitat, 24.83 units of hedgerow and 1.90 watercourse units. This equates to a 70.94% net gain in area habitats, a 61.48% net gain in hedgerow habitats and a 24.32% net gain in watercourse habitats, as a result of the proposed development.

3.14. Appropriate offsets from existing features on site have been reflected within the design of the scheme. It is considered that necessary mitigation has been reflected in the scheme. Where necessary a Construction Environment Management Plan (CEMP) can be conditioned to any planning consent.

Landscape

3.15. The impact upon the local landscape has been given careful consideration in putting forward the proposed scheme. While a scheme of this size will inevitably be visible and have an effect on landscape character as set out in the Landscape and Visual Assessment (LVA) which forms part of the submission, the development has been located so to minimise effects as far as possible.

3.16. Landscape mitigation proposals, include the following where practicably possible:

- Offsetting from the existing field boundaries and hedgerow to avoid impact on the root protection areas..
- Management and enhancement of all existing field boundary hedgerows.
- Creation of over 2.7km of new native species-rich hedgerow lengths, accompanied with new native tree planting along hedgerow lengths, plus over 400m of enhancement to existing hedgerows.
- Physical offsets to be provided from the Public Rights of Way that cross the site.

3.17. The site layout and landscape strategy plan (P21-2947_EN_100 Rev E), illustrates that sections of the boundary vegetation will be infilled and strengthened including the planting of native tree species which would restrict any potential views from outside the site.

3.18. Further consideration of the landscape and visual effects is contained within the LVA.

Use

3.19. It is proposed that the use of the application site will be for the construction, operation and maintenance and decommissioning of a ground mounted 49.9MW solar farm, comprising solar PV panels and associated infrastructure.

3.20. The solar photovoltaic modules would convert sunlight into electricity. The modules do this by capturing photons, or particles of light, and using their energy to knock electrons free from their bonds, thus allowing them to move again and generate a flow of current. A solar PV module consists of a layer of silicon cells, and anodised aluminium frame, a glass casing, and various wiring to allow current to flow from the silicon cells. Silicon is a non-metal with conductive properties that allows it to absorb and convert sunlight into electricity. When light interacts with a silicon cell, it causes electrons to be set into motion, which initiates a flow of electric current.

3.21. The proposed Solar Farm will result in an additional land use during the temporary 40-year period. Due to the nature of the development, such as the raised panels and separation distance between each row of panels, the land can be grazed by sheep, therefore allowing a dual use for both farming and renewable electricity production to occur in tandem. Due to the temporary and reversible nature of the development the agricultural use will also be retained in the long term.

3.22. As noted above, the site will be capable of dual use farming during its operational period, with small livestock (such as sheep) able to graze the land between and amongst the panels.

3.23. In addition, the minimal physical intrusion of the development itself will mean that the panels can be removed after their 40-year lifetime and the land will revert swiftly to full agricultural use. In this respect, the proposed scheme will result in a less permanent impact than most other forms of development, including some alternative methods of renewable energy production.

3.24. Due to the land required for such projects, these will generally need to be located outside of urban areas and within the countryside, where the capacity to accommodate such development exists. At end of the 40-year period the land is not considered 'Brownfield' or Previously Developed Land.

3.25. This Design and Access Statement, and the accompanying documents including the Site Alternatives Study set out why it is considered that this particular site is well suited to accommodate the proposed use.

Amount and Fabrication

3.26. The extent of the proposed development has been refined and finalised having consideration of potential environmental effects. A thorough constraint analysis has been undertaken for the site and informed the final layout. The proposed development benefits from landscape and ecological enhancements, including new and in-filled hedgerow planting. New lengths of hedgerows along footpaths have also been proposed as well as accommodating the routes a Green Infrastructure Enhancement Corridor to benefit a range of wildlife including invertebrates and foraging bats as well as birds and small mammals. Species rich grassland is proposed on the land beneath and surrounding the panels. Furthermore, provision of bat roost boxes, bird nest boxes, dormouse nesting boxes and habitat piles features within the development would ensure that the resident populations are accommodated, and further species move into the site.

3.27. The proposed development on the site will consist primarily of a steel framework to support the panels. In addition, inverter, substation, weld mesh fencing to the substation and deer fencing are proposed with CCTV system to restrict access and protect the scheme from theft and vandalism, as described below.

3.28. The design principles of the solar farm are:

- The solar panels would be laid out in straight arrays from east-west across the field enclosures.
- The maximum top height of the solar panels would be 3.6m. Full panel details are shown on the submitted Typical PV Module and Rack Details (Figure 8 – Drawing Number 04531-RES-SOL-DR-PT-001 Rev 2).
- The panel framework will be driven into the soil removing the need for deep foundation. Such supporting systems are reversible
- Individual rows are separated by a minimum of 2m to prevent shading.
- The solar panel modules are bi-facial ground mounted solar photovoltaic (PV) panels which are black in colour.
- The solar panel module frame would be constructed of anodized aluminium alloy.

- A galvanised steel post mounting system will support the solar array.
- Centralised inverters are used and are situated across the site, as shown on the submitted Infrastructure Layout (Figure 4 – Drawing Number 04531-RES-LAY-DR-PT-003 Rev 5) and Typical Inverter Substation (Figure 9 – Drawing Number 04531-RES-SOL-DR-PT-002 Rev 1).

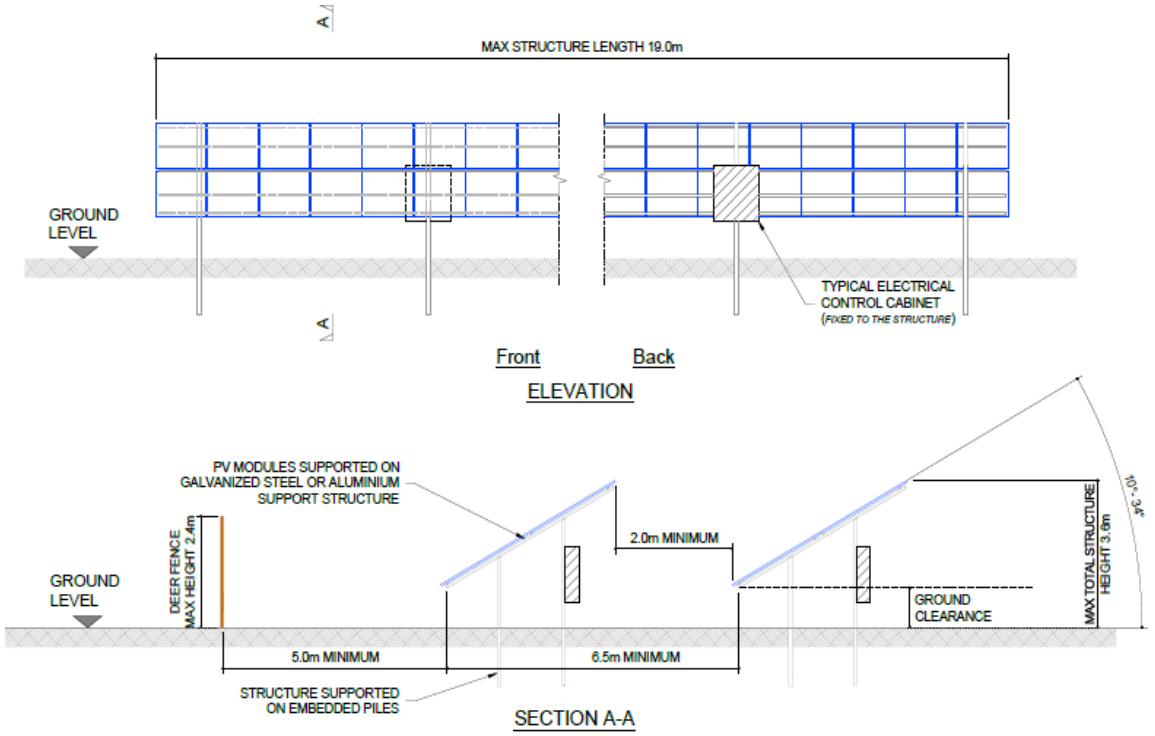

Image 6a – PV Module Elevations (Figure ref 8)

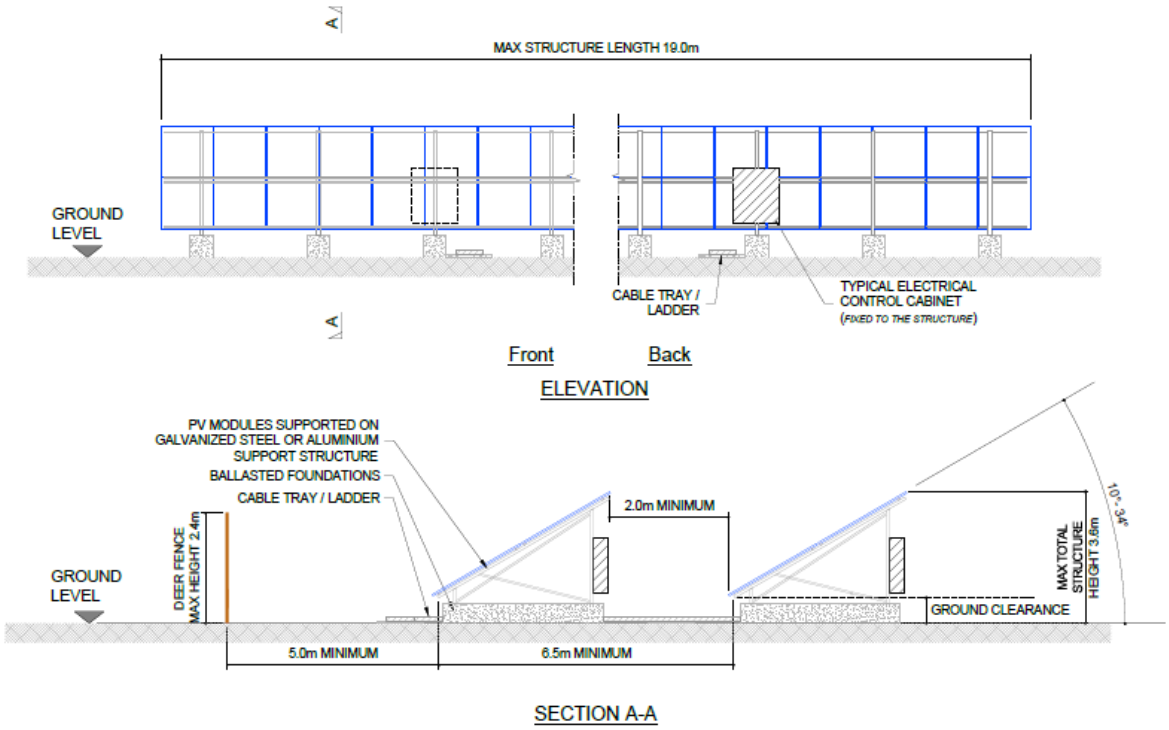

Image 6b – PV Module Elevations including concrete feet foundation (Figure ref 8)

Inverters and Transformers

3.29. A series of inverters are proposed through the Site. The inverters convert direct current (DC) generated by the PV panels into alternating current (AC). Transformers then convert low voltage output from the inverters to high voltage suitable for feeding into the network.

3.30. Typically, the inverters are housed in prefabricated metal containers, finished in either a grey or green colour. The containerised solution makes their removal at the end of the operational life easier. Each unit measures c. 5m x 3m x 3m (L x W x H) and would be

positioned on a hardcore based on top of blocks as detailed on the Typical Inverter Substation (Figure 9 – Drawing Number 04531-RES-SOL-DR-PT-002 Rev 1).

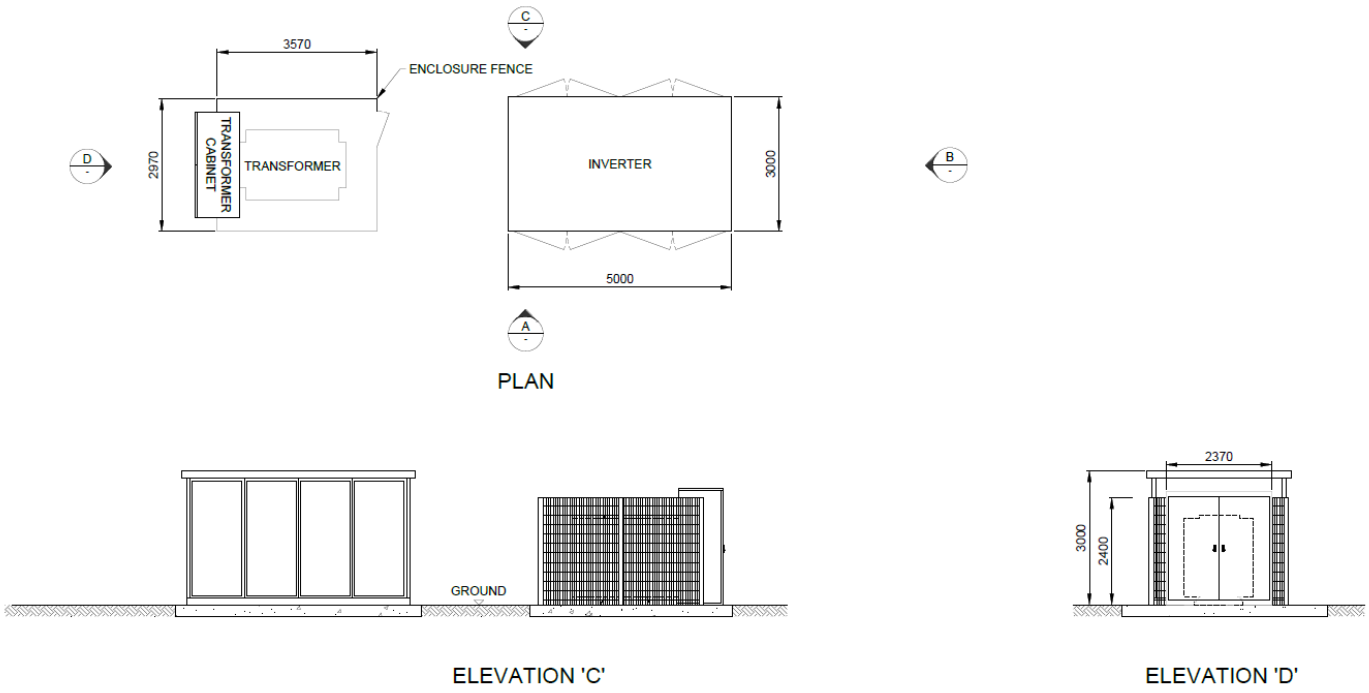

Image 7 – Inverter Detail (Figure 9)

Point of Connection

3.31. The point of connection is located to the north West of the site. Cabling will run from the inverter stations to the project substation, where the electricity will be exported to the existing overhead line to the distribution network. Additional works that would be required to facilitate the connection have been considered in the Environmental Impact Assessment which forms part of the wider planning submission.

3.32. The insulated cables from the solar modules will be routed in channels fixed on the underside of the framework. The DC string cables will run along the entire underside of each row. The electrical cabling from each array will be concealed through shallow trenches

linking the modules to the inverter substations and then to the main substation. The cable trench may also carry earthing and communications cables and will be backfilled with fine sands excavated materials to the original ground levels.

Perimeter Fencing and Security

3.33. The solar farm would be set within deer fencing up to 2.4m in height with wooden supporting posts placed at intervals as detailed on the submitted Perimeter Deer Fence (Figure 12 – Drawing Number 04531-RES-SEC-DR-PT-002 Rev 1). The deer fencing would follow the outer field boundaries containing the solar panels. Small mammal access points will be prescribed at various locations along any fencing to allow the passage of wildlife across the site.

3.34. In addition to fencing, it is proposed that 3.5m high pole mounted CCTV security cameras as detailed on the submitted CCTV Typical Details (Figure 13 – Drawing Reference 04531-RES-SEC-DR-PT-003 Rev 1) would be positioned at intervals along the inside edge of the fencing (between the fence and the arrays), to capture activity within and along the fence line.

3.35. The perimeter fencing and pole-mounted CCTV system serves an important purpose in protecting the valuable equipment within the application site. The CCTV system proposed (as detailed on Figure 13) will be capable of recording clear images that will meet the standards as set out in the Home Office Publication 28/09 CCTV Operational Requirement Manual 2009 as well as the UK Police Requirement for Digital CCTV Systems 09/05.

3.36. The substation compound, located to the north of the site, will be bound by security fencing. This would comprise a 2.4m high wire mesh fence. This type of fencing has been selected as it is deemed to be less visually intrusive than a palisade fence. Full details of this fence are provided on the submitted Security Fence (Figure 11 – Drawing Reference 04531-RES-SEC-DR-PT-001 Rev 2)

Appearance

3.37. Visual effects of the proposed development have been assessed in the LVA. In addition to this existing vegetation, as part of the landscape enhancement proposals for the site, sections of existing hedgerow are to be strengthened to further restrict and prevent views of the proposed development. In the longer term, as a result of the mitigation planting, visual effects would be reduced. As it establishes, the layering effect of the vegetation will successfully integrate the proposed development into the landscape, particularly during the initial summer months.

3.38. The bi-facial solar panels themselves have a dark blue face with a matte silver-coloured anodized aluminium frame. The purpose of the panels is to absorb and not reflect light. Modern PV panels benefit from an anti-reflective coating to limit the glint and glare associated with much earlier versions of the technology. The panels are mounted on a steel or aluminium framework that is galvanized and does not glint or gleam in the light.

3.39. The appearance of the solar farm and the associated equipment are, in the most part, dictated by their electrical function and purpose.

4. ACCESS

4.1. Construction access will be provided from the A4074 to the west of the site.

4.2. The components which are required to construct the scheme will arrive on Heavy Good Vehicles (HGVs). The level of traffic during the temporary construction period would equate to approximately 100 two-way movements per day. The construction route is suitable to accommodate larger vehicle trips.

4.3. A maximum of up to 60 construction operatives are forecast to be onsite during peak times of the construction period. A temporary car parking area will be provided on the site within the contractor's compound. Parking will therefore be contained within the site and no parking will occur on the local highway.

4.4. A detailed Construction Traffic Management Plan (CTMP) has been prepared to demonstrate how the site will be accessed during the construction period.

4.5. After commissioning, there is anticipated to be around 15 Light Goods Vehicles (LGVs) accessing the site per year, equating to 30 two-way trips. These would typically be made by a light van or 4x4 type vehicle. Whilst the contractor's compound will have been removed, space will remain within the site for such a vehicle to turn around to ensure that reversing will not occur onto the local highway network.

5. SUMMARY AND CONCLUSIONS

5.1. The Design and Access arrangements of the proposed development have been assessed. It is considered that due to the appearance of the scheme and the natural screening afforded to the site alongside the landscape and ecological enhancements proposed, the development proposals will not have an unacceptable adverse effect on the visual amenity value of the wider countryside.

5.2. The site and extent of development have been carefully selected. It is naturally screened and supplemented by additional planting which will result in only limited view of the site being possible. Landscape considerations are outlined within the submitted Landscape and Visual Assessment.

5.3. The equipment forming the development proposals have been selected on the basis of maximising efficiency and productivity, but also to minimise visual effect where possible.

5.4. Safe access can be taken into the site from the public highway off the A4074 an existing access roads established to the site,. Mitigation measures will be employed to ensure construction traffic is managed appropriately as outlined within the submitted Construction Traffic Management Plan.

5.5. Overall, the proposals are appropriate in terms of design and access and the development represents a necessary step towards meeting the UK's legally binding climate change and renewable energy obligations. It is therefore considered that the application before Sevenoaks Council is to be supported and Planning Permission granted.

Town & Country Planning Act 1990 (as amended)
Planning and Compulsory Purchase Act 2004

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