Craig Y Perthi Solar Farm Resubmission

Environmental Statement

Chapter 04: Scheme Description and Construction Methods

Prepared for

RWE Renewables UK

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CONTENTS

IMAGES

FIGURES (Volume 3)

APPENDICES (Volume 4)

4.0 SCHEME DESCRIPTION AND CONSTRUCTION METHODS

4.1 Introduction

4.1.1 This chapter describes the Proposed Development and the parameters used for the purposes of the Environmental Impact Assessment. It identifies the principal components of the solar farm, the embedded mitigation and standard environmental controls, and the anticipated methods of construction, operation and decommissioning.

4.1.2 The Applicant is seeking planning permission for the construction and operation of Craig Y Perthi Solar Farm, comprising a renewable electricity generating station with a maximum export capacity of approximately 99.9 MW. The Proposed Development would include ground-mounted photovoltaic solar arrays, string inverters and transformers, an onsite substation and switchgear infrastructure, together with access tracks, electrical cabling, security measures, landscaping, ecological enhancement and associated development.

4.1.3 The solar farm would occupy an overall area of approximately 196 ha. Approximately 111 ha would be enclosed by security fencing and contain solar panels and associated generating infrastructure. The remaining land would principally accommodate retained agricultural land, landscape and ecological measures, Public Rights of Way, permissive paths and other green infrastructure.

4.1.4 The main components of the Proposed Development would comprise::

i) photovoltaic solar panels and associated support frames;
ii) string inverters and associated transformers;
iii) an onsite 132 kV substation and associated electrical infrastructure;
iv) two switchgear buildings and associated control and communications equipment;
v) underground electrical cabling within the Site;
vi) an approximately 10 km underground grid connection, principally within the highway boundary, to the Grid Supply Point at Uskmouth Power Station;
vii) approximately 7.8 km of access tracks, using existing farm entrances, tracks and field openings wherever practicable;
viii) wooden post deer and stock fencing incorporating mammal gates;
ix) inward-facing infrared CCTV cameras mounted on poles up to 3 m high;
x) approximately 5 km of improved Public Rights of Way and green lanes;

xi) approximately 3.3 km of new permissive paths;
xii) more than 11 km of new native hedgerow and tree planting, together with the reinforcement and management of existing hedgerows;
xiii) areas of native woodland planting and a community orchard;
xiv) approximately 43.3 ha of diverse wildflower meadow, including habitat managed for shrill carder bee;
xv) approximately 16.5 ha of dedicated lapwing nesting habitat, including predator-control fencing; and
xvi) other ecological features, including bird and bat boxes, bee and insect hotels, reptile hibernacula and log piles.

4.1.5 The Proposed Development does not include the battery energy storage system or central inverter stations that formed part of the Previous Application. Electricity generated by the solar panels would instead be converted using string inverters positioned close to the panel rows and transferred through the onsite electrical network to the substation for export to the electricity grid.

4.1.6 The Proposed Development would have a maximum export capacity of approximately 99.9 MW and would generate sufficient renewable electricity to meet the equivalent annual electricity requirements of approximately 42,077 Welsh homes. It is estimated to displace approximately 2.8 million tonnes of carbon dioxide over its 40-year operational life, compared with the equivalent generation from the projected electricity-grid mix.

4.1.7 The general arrangement of the solar farm and its landscape and ecological proposals is shown on Figure 4.1, the Illustrative Landscape Masterplan. The detailed locations of the generating infrastructure, compounds, access tracks, fencing and other components are shown on the Proposed Site Layout and supporting planning drawings.

4.1.8 The planning drawing pack includes indicative details of:

i) photovoltaic panels, support frames and string inverters;
ii) spares containers;
iii) onsite and grid-connection cable trenches;
iv) the substation compound;
v) v) switchgear and control buildings;

vi) fencing, access tracks and CCTV;
vii) access gates; and
viii) temporary construction compounds.

4.1.9 The final selection of equipment would be undertaken through detailed design and procurement. The precise make and model of individual components may therefore vary from the indicative information presented. However, the development would remain within the dimensions, locations and other parameters described in this chapter and shown on the application drawings, which provide the reasonable worst-case basis for the assessments contained in this ES.

4.1.10 The Proposed Development would operate for approximately 40 years. Following the operational period, the solar-generating infrastructure would be decommissioned and removed, and the affected land restored, unless further planning permission were granted. The anticipated construction, operational and decommissioning activities are described later in this chapter.

4.2 Key Design Considerations

Consideration of Major Accidents and Disasters

4.2.1 Paragraph 8 of Schedule 4 of the EIA Regulations requires the ES to describe any expected significant adverse environmental effects arising from the vulnerability of the Proposed Development to relevant major accidents or disasters. This includes the measures proposed to prevent or mitigate those effects and, where appropriate, the arrangements for emergency management.

4.2.2 A major accident or disaster is an event of sufficient scale or severity to result in serious harm to human health, communities or the environment and to require resources beyond those normally available to the operator or its contractors. Routine construction incidents and equipment failures that can be managed through normal working procedures do not constitute major accidents or disasters for the purposes of the EIA.

4.2.3 The consideration has been proportionate to the nature and location of the Proposed Development. The potentially relevant events comprise:

i) flooding and extreme weather;
ii) fire or major electrical failure;

iii) construction-related accidents involving plant, traffic or hazardous materials;
iv) external incidents associated with the adjacent transport network; and
v) deliberate damage, vandalism or unauthorised access.

4.2.4 The Proposed Development does not include the battery energy storage system that formed part of the Previous Application. Its removal materially reduces the quantity and concentration of potentially combustible electrical equipment and removes the potential for battery thermal runaway.

4.2.5 The solar panels principally comprise glass, metal and silicon-based components and would not ordinarily present a material risk of a major emission, explosion or rapidly developing fire. The string inverters, transformers, switchgear and substation would be designed, installed and operated in accordance with the relevant electrical and fire-safety standards.

4.2.6 Electrical equipment would incorporate appropriate protection, monitoring and isolation systems. The Proposed Development would be monitored remotely, with faults capable of being identified and affected equipment isolated where necessary. Routine inspection and maintenance would further reduce the likelihood of equipment failure developing into a major incident.

4.2.7 The potential vulnerability of the Proposed Development to flooding has informed its layout. Solar panels would be raised above ground level, while critical electrical infrastructure would be positioned outside areas of greater flood risk or raised on suitable foundations. Access tracks and compounds would use permeable construction where practicable, and surface-water management measures would be incorporated into the design.

4.2.8 The solar-panel frames, buildings and electrical infrastructure would be designed to withstand the anticipated wind, rainfall and temperature conditions over the operational life of the development. Appropriate earthing, surge protection and lightning-protection measures would be incorporated into the detailed electrical design.

4.2.9 Construction activities would be undertaken in accordance with the Construction (Design and Management) Regulations and the final Construction Environmental Management Plan. The controls would include safe working procedures, segregation

of plant and pedestrians, pollution prevention, secure storage of fuels and chemicals and arrangements for responding to spills, fires and other emergencies.

4.2.10 Construction traffic would be managed through the Construction Traffic Management Plan, including approved routes, delivery scheduling, banksman control and measures to protect other highway users. Works associated with the grid connection would be undertaken under appropriate traffic-management arrangements and any separate highways approvals required.

4.2.11 The Site would be enclosed by deer and stock fencing and monitored using inward-facing infrared CCTV. Access to the substation and other electrical infrastructure would be restricted to authorised personnel. These measures would reduce the potential for theft, vandalism, accidental access and deliberate interference.

4.2.12 Suitable access would be maintained for emergency services and maintenance personnel. Emergency procedures, contact details and responsibilities would be established through the final management plans and operational arrangements.

4.2.13 With the design, maintenance and management measures described above, the Proposed Development is not considered to be materially vulnerable to a major accident or disaster that could result in likely significant adverse environmental effects. The removal of the BESS further reduces the risk compared with the Previous Application

Climate Change

4.2.14 Paragraph 5(f) of Schedule 4 of the EIA Regulations requires the ES to consider both:

i) the effect of the Proposed Development on climate, including greenhouse-gas emissions; and
ii) the vulnerability of the Proposed Development to climate change.

Effect of the Proposed Development on Climate

4.2.15 4.2.15 The generation of electricity by the Proposed Development would not result in material direct operational greenhouse-gas emissions. However, lifecycle emissions would arise from the manufacture and transportation of equipment, construction activities, maintenance and eventual decommissioning.

4.2.16 Construction-related emissions would principally arise from:

i) embodied carbon within the solar panels, support structures, electrical equipment and other construction materials;
ii) transportation of materials and equipment to the Site;
iii) fuel used by construction plant and non-road mobile machinery;
iv) employee travel;
v) waste treatment and disposal; and
vi) construction of the grid connection and associated infrastructure.

4.2.17 These emissions would be reduced, where practicable, through measures including:

i) efficient design and procurement of materials;
ii) use of prefabricated components;
iii) minimisation and appropriate reuse of excavated material;
iv) maintenance of construction plant in efficient working order;
v) coordinated delivery scheduling and construction traffic management;
vi) car sharing and other sustainable workforce travel measures; and
vii) application of the waste hierarchy, with materials reused or recycled where practicable.

4.2.18 Once operational, the Proposed Development would have a maximum export capacity of approximately 99.9 MW. It is anticipated to generate sufficient renewable electricity to meet the equivalent annual electricity requirements of approximately 42,077 Welsh homes and to displace approximately 2.8 million tonnes of carbon dioxide over its 40-year operational life, compared with the projected electricity-grid mix.

4.2.19 The landscape and ecological proposals may provide additional climate-related benefits through new hedgerow, tree and woodland planting, reduced soil disturbance and less intensive agricultural management. These benefits are secondary to the principal contribution made through renewable electricity generation and have not been relied upon in calculating the estimated carbon displacement.

4.2.20 The Proposed Development would therefore make a substantial beneficial contribution to the decarbonisation of electricity generation. Its operational benefits

are expected to outweigh the greenhouse-gas emissions associated with its manufacture, construction, maintenance and decommissioning.

Vulnerability of the Proposed Development to Climate Change

4.2.21 Climate projections indicate an increased likelihood of warmer and wetter winters, hotter and drier summers, more intense rainfall and severe weather events over the operational life of the Proposed Development. The design has therefore considered potential changes in flooding, temperature, storms and ground conditions.

4.2.22 The solar arrays would be raised above ground level and would not materially impede the passage or infiltration of surface water. Vegetation would be maintained beneath and between the arrays to reduce erosion and surface-water runoff. Permeable access tracks, local drainage measures and the positioning or raising of critical electrical infrastructure would provide resilience to increased rainfall and localised flooding.

4.2.23 The detailed design would specify solar panels, inverters, transformers and switchgear capable of operating within the anticipated range of future temperatures. Electrical equipment would incorporate monitoring and protective systems capable of reducing output or isolating components should operating conditions fall outside safe limits.

4.2.24 Solar-panel support structures, fencing and buildings would be designed for the anticipated wind and weather conditions. Routine inspection and maintenance would identify damage or deterioration arising from severe weather and enable timely repair or replacement.

4.2.25 The landscape and ecological proposals would be implemented through the Landscape and Ecology Management Plan. Planting specifications and management measures would take account of local conditions and the need to establish a resilient and diverse landscape framework over the operational period.

4.2.26 Subject to the design and management measures described above, the Proposed Development is not expected to be materially vulnerable to climate change or to give rise to likely significant adverse environmental effects as a consequence of that vulnerability.

4.2.27 This version reduces the current section from approximately five pages to a more proportionate assessment and removes all BESS-specific fire-risk material.

4.3 Embedded Mitigation

4.3.1 The iterative design of the Proposed Development has incorporated measures to avoid or reduce environmental effects at source. These measures form part of the scheme assessed within this ES and are therefore treated as primary or embedded mitigation.

4.3.2 This section summarises the principal embedded measures. Further detail is provided on Figure 4.1, the Illustrative Landscape Masterplan, the application drawings and the relevant technical chapters. The design evolution that led to the selected layout is described in Chapter 3.0 and is not repeated here.

4.3.3 Site Extent and Layout

4.3.4 The southeastern part of the Previous Application has been removed from the Proposed Development. No solar panels, access tracks or other solar-farm infrastructure are now proposed within the Gwent Levels – Redwick and Llandevenny Site of Special Scientific Interest.

4.3.5 The revised layout also avoids the area in which peat-bearing deposits were identified during investigation of the Previous Application. This avoids piling, trenching and other intrusive construction works within that area.

4.3.6 The solar infrastructure has been arranged within the existing agricultural field pattern. Existing hedgerows, trees, woodland, reens and ditches would be retained wherever practicable, with infrastructure positioned to minimise the need for vegetation removal or alteration of drainage features.

4.3.7 Existing farm tracks, field entrances and gaps within hedgerows would be used where practicable for construction and operational access. This reduces the requirement for new field openings, vegetation removal and disturbance to established habitats.

4.3.8 The existing landform would be retained. Solar-panel support posts would generally be driven directly into the ground, avoiding extensive foundations, cut-and-fill earthworks or widespread regrading.

Landscape and visual

4.3.9 Substantial undeveloped areas would be maintained around Bishton, St Cadwaladr's Church, Bishton Castle and other sensitive landscape, visual and heritage receptors. This provides separation between solar infrastructure and nearby properties, public routes and designated heritage assets.

4.3.10 The existing landscape framework would be retained and reinforced through:

i) more than 11 km of new native hedgerow and tree planting;
ii) infilling and strengthening of existing hedgerows;
iii) native woodland planting;
iv) specimen and hedgerow-tree planting at selected locations;
v) establishment of a community orchard; and
vi) long-term management of retained and proposed vegetation.

4.3.11 Planting has been positioned to provide landscape integration, visual screening and habitat connectivity, while avoiding planting that would conflict with the ecological requirements of the dedicated lapwing habitat.

4.3.12 The fixed solar arrays would have a consistent height, orientation and angle. Existing and proposed vegetation would provide screening where necessary to reduce potential landscape, visual and glint-and-glare effects.

Biodiversity and Green Infrastructure

4.3.13 Approximately 16.5 ha of land would be managed as dedicated lapwing nesting and foraging habitat. This would comprise a coherent area of adjoining fields managed to provide suitable open conditions and would incorporate predator-control measures where required.

4.3.14 Approximately 43.3 ha of diverse wildflower meadow would be established across the Site. Seed mixes and management prescriptions would be selected to provide a range of habitat conditions, including suitable forage and food plants for shrill carder bee.

4.3.15 The proposed habitats would connect with retained hedgerows, woodland, reens, ditches and field margins, creating a linked green infrastructure network across the Site.

4.3.16 Additional ecological features would include bird and bat boxes, bee and insect hotels, reptile hibernacula and log piles. Their locations and specifications would be established through the Landscape and Ecology Management Plan.

4.3.17 Appropriate clearance would be maintained beneath and between the solar panels to allow vegetation growth, ecological management and continued movement and foraging by wildlife.

4.3.18 No permanent obstruction would be placed across reens or other watercourses. Crossings would be minimised and designed to retain the movement of water and fauna, including otter and water vole where present.

Environmental Buffers

4.3.19 Minimum environmental buffers have been incorporated into the layout to protect retained habitats and landscape features. These comprise:

vii) 15 m from woodland, including Ancient Woodland;
viii) buffers around Ancient and Veteran trees based on the root-protection and other requirements identified within the Arboricultural Impact Assessment;
ix) 12 m from reens;
x) 7 m from other ditches; and
xi) 5 m from hedgerows.

4.3.20 Greater separation has been provided where required by the sensitivity of a particular receptor, the findings of the technical assessments or the need to accommodate landscape, ecological or public-access measures.

Water Resources and Flood Risk

4.3.21 Solar panels would be raised above ground level and arranged with gaps between the modules, allowing rainfall to reach the vegetation beneath and between the arrays.

4.3.22 Grassland and other vegetation would be maintained beneath and between the panels to reduce soil erosion and the concentration of surface-water runoff.

4.3.23 New access tracks and temporary construction compounds would use permeable stone or other permeable surfacing where practicable. This would allow rainfall to infiltrate and would minimise changes to existing surface-water drainage.

4.3.24 Critical electrical infrastructure would be positioned outside areas of greater flood risk or raised on suitable foundations where necessary. Local filter drains, stone surrounds and other drainage measures would be incorporated where required.

Public Rights of Way and Recreational Access

4.3.25 Existing Public Rights of Way and green lanes would be retained within the layout. Approximately 5 km of routes would be improved through enhanced surfacing, management, signage and the provision of landscaped corridors.

4.3.26 Approximately 3.3 km of new permissive paths would also be provided, improving recreational connectivity across and around the Site.

4.3.27 The routes would be separated from the solar panels by appropriate margins, fencing and planting. They would remain available during operation, while any temporary construction-phase management or diversion required for public safety would be controlled through the Construction Environmental Management Plan and agreed with the relevant authority.

Agriculture and Soils

4.3.28 The spacing and clearance beneath the solar arrays would allow the majority of the fenced area to remain under agricultural or grassland management, including sheep grazing where appropriate.

4.3.29 Soil disturbance would be minimised through the use of driven support posts, limited foundations and the reuse of excavated soils. Topsoil and subsoil would be handled and stored separately where excavation is required.

Lighting and Security

4.3.30 Security would be provided through deer and stock fencing and inward-facing infrared CCTV. The fencing would incorporate openings to maintain movement by small mammals.

4.3.31 No permanent external lighting would be installed across the solar-panel areas. Operational lighting would be limited to low-level, motion-activated or manually controlled lighting at buildings and critical infrastructure and would only be used when required for safety, security or maintenance.

4.3.32 The embedded measures described above have been taken into account in the assessment of likely environmental effects. Additional construction controls, secondary mitigation and monitoring measures are described in Section 4.4 and the relevant technical chapters.

4.4 Standard Control Measures

4.4.1 In addition to the embedded mitigation described in Section 4.3, standard environmental controls would be implemented during construction, operation and decommissioning. These measures comprise secondary and tertiary mitigation for the purposes of the EIA methodology described in Chapter 2.0.

4.4.2 The principal management documents would comprise:

i) Construction Environmental Management Plan ('CEMP');
ii) Construction Traffic Management Plan ('CTMP');
iii) Construction Phase Travel Plan;
iv) Landscape and Ecology Management Plan ('LEMP'); and
v) Decommissioning Environmental Management Plan, to be prepared before decommissioning begins.

4.4.3 Draft or outline versions of the CEMP, CTMP and LEMP accompany the application. Final versions would be prepared following appointment of the principal contractor and completion of detailed design and would be submitted to and approved by the relevant authority before the associated works or management activities commence.

4.4.4 The final documents would incorporate the mitigation and monitoring identified through the EIA, statutory consultation, Pre-Application Consultation and any requirements imposed through the planning permission. They would also be updated where necessary to reflect current legislation, guidance, survey information and construction methods.

Outline Construction Environmental Management Plan

4.4.5 An Outline Construction Environmental Management Plan is provided at Appendix 4.1. It establishes the framework through which construction-related environmental effects would be controlled and monitored.

4.4.6 The final CEMP would identify the roles and responsibilities of the Applicant, principal contractor, specialist contractors and environmental personnel. This would include the appointment of an appropriately experienced Environmental Manager and, where required, an Ecological Clerk of Works and archaeological specialists.

4.4.7 The CEMP would include procedures and control measures relating to:

i) site establishment and construction phasing;
ii) protection of designated sites and retained habitats;
iii) pre-construction ecological surveys and protected-species procedures;
iv) protection of trees, hedgerows, woodland, reens, ditches and environmental buffers;
v) soil stripping, handling, storage and reinstatement;
vi) surface-water management, pollution prevention and spill response;
vii) storage and handling of fuels, oils and chemicals;
viii) construction noise, vibration and working hours;
ix) dust and air-quality controls;
x) construction lighting;
xi) waste prevention, segregation, storage and disposal;
xii) archaeological protection and procedures for unexpected discoveries;
xiii) management of Public Rights of Way and permissive routes;
xiv) construction-site security;
xv) community liaison and complaints procedures; and
xvi) emergency preparedness and incident response.

4.4.8 Before construction begins, an environmental walkover would be undertaken to identify any material change in baseline conditions since completion of the EIA surveys. The findings would inform the final CEMP, working methods and any pre-construction survey requirements.

4.4.9 Construction works would remain within the approved development areas, compounds, accesses and working corridors. Temporary fencing and signage would be installed to protect retained habitats, root-protection areas, watercourses, archaeological areas and other sensitive features.

4.4.10 Fuels, oils and chemicals would be stored within secure, appropriately bunded areas. Refuelling would take place within designated locations, and spill kits would be maintained at suitable points across the construction areas.

4.4.11 Construction lighting would be limited to that required for health, safety and security. It would be directional, positioned to minimise light spill and used only during approved working hours or where required in an emergency.

4.4.12 The contractor would establish a community liaison procedure before construction begins. This would provide local residents, businesses and other stakeholders with information about the construction programme, particularly disruptive activities and traffic arrangements, and would establish a clear process for reporting and responding to enquiries or complaints.

Construction Traffic Management Plan

4.4.13 A Construction Traffic Management Plan is provided at Appendix 4.2. It describes the proposed construction access arrangements, delivery routes, anticipated vehicle movements and measures for managing effects on the highway network and other road users.

4.4.14 The final CTMP would be agreed with Newport City Council and, where relevant, the Welsh Government as highway authority for the strategic road network. It would be updated to reflect the appointed contractor's programme, supply chain and detailed construction methodology.

4.4.15 The CTMP would include:

i) approved construction access and delivery routes;
ii) the locations and operation of construction compounds and access points;
iii) a delivery-management and booking system;
iv) restrictions on delivery times;
v) arrangements for abnormal or larger loads where required;
vi) temporary traffic-management measures;
vii) measures to prevent vehicles waiting on the public highway;
viii) wheel washing and highway-cleaning procedures;
ix) ix) road-condition surveys and procedures for addressing construction-related damage where required;
x) banksman and traffic-marshal arrangements;

xi) measures to protect pedestrians, cyclists, equestrians and users of Public Rights of Way;
xii) signage and temporary route-management measures;
xiii) communication with residents, businesses and highway authorities; and
xiv) monitoring and review procedures.

4.4.16 Construction deliveries would principally use the strategic and classified highway network before approaching the Site along the approved local routes. Use of minor roads by Heavy Goods Vehicles would be minimised where practicable.

4.4.17 Deliveries would be coordinated through designated construction compounds. Where reasonably practicable, materials would be transferred from the compounds to individual work areas using internal tracks and agricultural vehicles, reducing the need for repeated Heavy Goods Vehicle movements on local roads.

4.4.18 Vehicles leaving the Site would be inspected and cleaned where necessary to prevent mud and debris being deposited on the public highway. Road-sweeping equipment would be deployed where required.

4.4.19 A Construction Phase Travel Plan would accompany or form part of the final CTMP. It would encourage car sharing, contractor minibuses and other measures to reduce individual staff journeys to the Site.

Public Rights of Way

4.4.20 Existing Public Rights of Way would remain available during construction wherever this could be achieved safely. Where temporary management, a short diversion or a temporary closure is necessary, this would be agreed in advance with Newport City Council and implemented using appropriate signage, fencing and public information.

4.4.21 Construction activities crossing or taking place close to a public route would be managed through measures such as banksman control, temporary barriers, controlled crossing points and short-duration restrictions. Safe access would be restored as soon as practicable following completion of the relevant works

Landscape and Ecology Management Plan

4.4.22 A draft Landscape and Ecology Management Plan is provided at Appendix 4.3. The LEMP would govern the establishment, management and monitoring of the landscape and ecological measures forming part of the Proposed Development.

4.4.23 The LEMP would include prescriptions for:

i) existing and proposed hedgerows;
ii) woodland, tree and orchard planting;
iii) wildflower meadows and other grassland habitats;
iv) dedicated lapwing habitat;
v) habitat measures for shrill carder bee;
vi) reens, ditches and field margins;
vii) bird and bat boxes, insect hotels, hibernacula and log piles;
viii) Public Rights of Way, permissive paths and green corridors;
ix) replacement of failed planting;
x) control of invasive or undesirable species; and
xi) monitoring, reporting and remedial management.

4.4.24 The final LEMP would identify measurable establishment and management objectives, the frequency and duration of monitoring and the circumstances in which remedial or adaptive management would be required.

Implementation and Review

4.4.25 Compliance with the approved management plans would be mandatory for the Applicant, its contractors and the future operator. Relevant requirements would be incorporated into construction contracts, site inductions, method statements and operational procedures.

4.4.26 Environmental inspections and audits would be undertaken during construction to confirm compliance and identify any corrective action required. Records of incidents, complaints, monitoring and remedial works would be maintained and made available to the relevant authority where required.

4.4.27 The standard control measures described in this section have been taken into account where relevant in the assessment of residual environmental effects. Topic-

specific mitigation and monitoring requirements are described in the relevant technical chapters and summarised in Chapter 10.0.

4.5 Components of the Solar Farm

4.5.1 This section describes the principal physical components of the Proposed Development. The equipment shown on the application drawings is indicative of the type of infrastructure that would be installed. The final equipment would be selected through detailed design and procurement but would remain within the locations, dimensions and other parameters secured through the planning permission.

Solar Panels and Frames

4.5.2 The Proposed Development would comprise fixed photovoltaic solar panels mounted on steel and aluminium support frames. The proposed arrangement of the panels is shown on the Site Layout and a typical configuration is illustrated in Image 4.1.

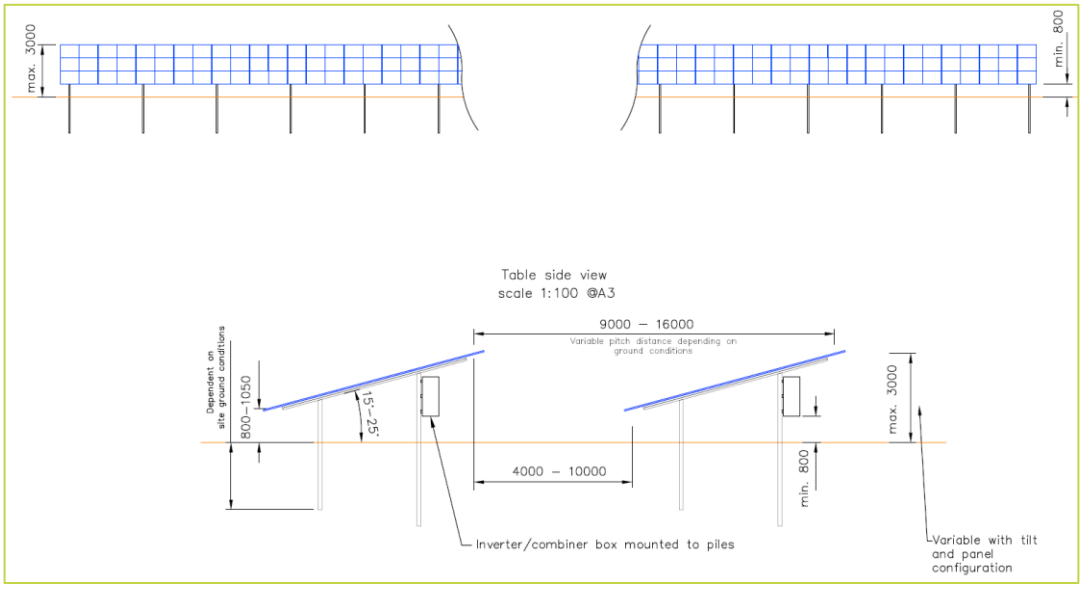

Image 4.1 Photovoltaic table layout

4.5.3 The panels would generally face due south and would be installed at an angle of approximately 15° to 25° from the horizontal. The final angle would be determined through detailed design to optimise electricity generation while remaining within the parameters assessed by the ES.

4.5.4 The layout, orientation and spacing of the panels have been informed by modelling of solar exposure and shadowing. The arrangement would seek to maximise

electricity generation while avoiding unacceptable glint-and-glare effects at residential properties, the South Wales Main Line railway, the M4 motorway and other nearby roads.

4.5.5 The solar-panel support frames would be arranged in parallel rows generally separated by approximately 4 m to 10 m. The precise separation would vary according to topography, orientation, access requirements, environmental buffers and the need to prevent one row from materially overshadowing another.

4.5.6 The lower leading edge of the panels would be approximately 800 mm to 1,050 mm above ground level. The upper edge would be no more than approximately 3 m above existing ground level.

4.5.7 The clearance beneath the panels and the separation between rows would permit vegetation management and continued agricultural use, including sheep grazing where appropriate. It would also allow rainfall to reach the ground beneath and between the panels.

4.5.8 The support structures would generally comprise steel uprights with aluminium or steel cross-members. The uprights would ordinarily be driven into the ground using specialist piling equipment to a depth of approximately 1 m to 2 m, depending on ground conditions and detailed structural requirements.

4.5.9 Where ground penetration is inappropriate because of archaeological remains, utilities, ground conditions or another identified constraint, alternative mounting arrangements may be used. These could include surface-mounted or shallow concrete supports, subject to the relevant environmental controls and the approved development parameters.

4.5.10 The precise photovoltaic-module specification would be selected through procurement. The modules would generally comprise dark blue, dark grey or black cells within a metal frame and would incorporate an anti-reflective surface designed to maximise the absorption of sunlight.

String Inverters

4.5.11 The solar panels would generate electricity as direct current. String inverters would convert this electricity into alternating current for transmission through the onsite electrical network.

4.5.12 The string inverters would be distributed across the solar farm and positioned close to the panel rows that they serve. They would generally be mounted on the rear of the support structures or on separate small supporting frames.

4.5.13 The revised Proposed Development does not include the larger central inverter stations that formed part of the Previous Application. The use of string inverters removes the requirement for substantial containerised inverter buildings distributed across the Site.

4.5.14 The precise number and specification of string inverters would depend on the final panel and electrical design. Each unit would remain within the dimensions and locations shown on the relevant planning drawing and would be installed above ground level where required for drainage and operational resilience.

4.5.15 Cabling between the panels and string inverters would principally be secured to the rear of the support frames. It would be protected from livestock and accidental damage using suitable positioning, elevation or protective trunking.

Transformers

4.5.16 Transformers would be distributed across the Site to increase the voltage of the electricity received from groups of string inverters before it is transferred to the onsite substation.

4.5.17 The transformers would be located alongside the internal electrical network and access tracks, within the locations identified on the Site Layout. They would be positioned to provide operational access while maintaining the environmental buffers described in Section 4.3.

4.5.18 Transformer equipment would generally be installed on concrete sleepers, small concrete slabs or other suitable foundations, depending on ground conditions and the selected equipment. Permeable stone surrounds or local filter drainage would be provided where required.

4.5.19 The transformers and associated enclosures would be finished in an appropriate recessive colour, likely to comprise a muted green or grey. The final colour and detailed appearance would be agreed through the planning permission where necessary.

Onsite Electrical Cabling

4.5.20 Underground cabling would connect the panels, string inverters and transformers to the onsite substation and switchgear infrastructure. The onsite network may also include earthing, communications, monitoring and data cables.

4.5.21 Cable trenches would generally follow access tracks, field boundaries and fence lines. This would facilitate future maintenance and reduce the extent of ground disturbance across agricultural fields.

4.5.22 Trenches would be excavated to an appropriate depth and width for the number and type of cables required. The cables or ducts would be placed on suitable bedding material and protected before the trench was backfilled using excavated material in the correct soil sequence.

4.5.23 An indicative onsite cable-trench arrangement is illustrated in Image 4.2. The final trench dimensions and number of ducts would depend on the detailed electrical design but would remain within the parameters assessed through the ES.

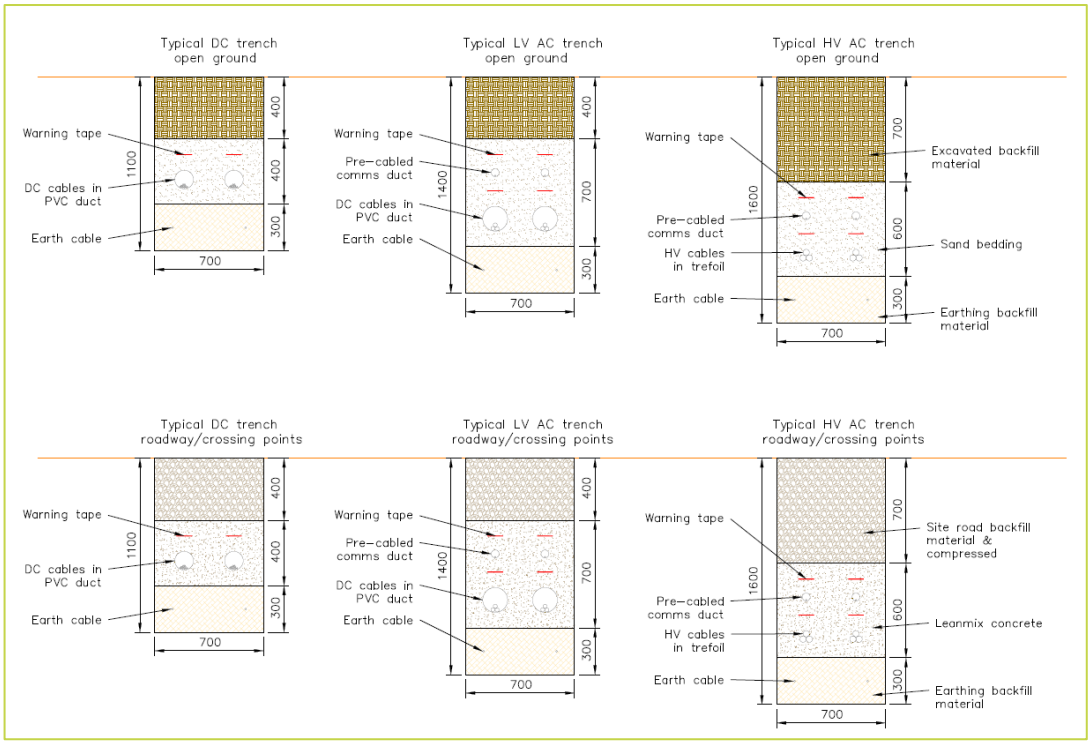

Image 4.2 Cable trench cross section

4.5.24 Marker tape, posts or other suitable means would be used to identify buried cable routes where required. In areas where ground disturbance is restricted, such as

archaeologically sensitive areas, alternative measures including surface-mounted protective trunking may be employed.

Substation and Operational Compound

4.5.25 An onsite 132 kV substation and associated electrical infrastructure would collect the electricity generated by the solar farm and facilitate its export to the electricity network.

4.5.26 The substation would be located within a secure operational compound, as shown on the Site Layout. Its position has been selected having regard to the onsite electrical network, grid-connection route, operational access, flood risk, landscape and visual effects and separation from residential properties.

4.5.27 The compound would accommodate the substation equipment, transformers, electrical protection equipment, control and communications infrastructure and other ancillary apparatus necessary for the operation of the solar farm.

4.5.28 Except for foundations and areas that require an impermeable surface for operational or pollution-control reasons, the compound would be surfaced using permeable stone or similar material. Local drainage would be provided where required.

4.5.29 The compound would be enclosed by secure fencing and accessed through lockable vehicular and pedestrian gates. The detailed fencing design would reflect the electrical operator's safety and security requirements.

4.5.30 The final design of the substation would be developed in consultation with the relevant network operator. The equipment would remain within the development parameters and maximum dimensions shown on the application drawings.

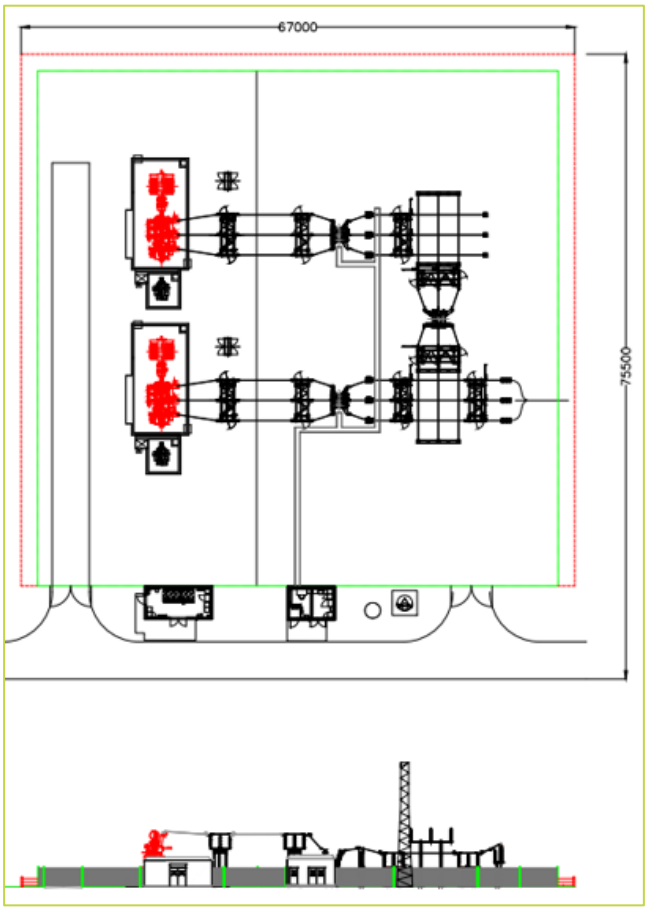

Image 4.3 Indicative Operational Compound

4.5.31 Buildings and equipment enclosures would be finished in an appropriate muted green or grey colour, with the final finish controlled through the planning permission where necessary.

Switchgear and Control Infrastructure

4.5.32 Two switchgear buildings would be provided as part of the Proposed Development. They would contain the electrical equipment necessary to control, isolate and protect the different sections of the onsite electrical network.

4.5.33 Control, monitoring and communications equipment would enable the performance of the solar farm to be supervised remotely. The Proposed Development would not be permanently staffed, although maintenance engineers would attend when required.

4.5.34 The buildings would be installed on suitable slab or sleeper foundations and would be finished in a muted green or grey. Their locations and maximum dimensions would be as shown on the application drawings.

4.5.35 Any limited operational welfare or storage provision would be contained within the approved buildings or ancillary containers and would not result in the Site being permanently occupied.

Spares and Ancillary Containers

4.5.36 A limited number of containers may be provided for the secure storage of replacement parts, maintenance equipment and other items required for the operation of the solar farm.

4.5.37 The containers would be located within or close to the operational compound, would remain within the dimensions shown on the relevant planning drawing and would be finished in a recessive colour.

Access Tracks

4.5.38 Approximately 7.8 km of access tracks would be provided across the Site. Existing farm tracks, entrances and field openings would be used wherever practicable.

4.5.39 New permanent tracks would generally be approximately 4 m wide, subject to local widening at bends, passing places, compounds and locations where larger equipment requires access.

4.5.40 The tracks would generally comprise permeable crushed-stone material placed over a geotextile or geogrid layer. Their final depth and construction would be determined by ground conditions and the loads they would be required to accommodate.

4.5.41 The track layout has been designed to follow existing field patterns and use established gateways where practicable, thereby minimising the loss of hedgerows and other boundary vegetation.

Security Fencing and CCTV

4.5.42 The areas containing solar panels and associated infrastructure would be enclosed by deer and stock fencing approximately 2 m high.

4.5.43 The fencing would generally comprise wire mesh secured to wooden posts. Mammal gates or openings, typically measuring approximately 200 mm by 200 mm, would be incorporated at suitable locations to retain movement by small terrestrial mammals.

4.5.44 Access gates would be provided at entrances to individual panel areas and operational compounds. The gates would be compatible with the adjacent fencing and secured against unauthorised access.

4.5.45 CCTV cameras would be mounted on poles up to approximately 3 m high and positioned around the perimeter of the secured areas. The cameras would face inwards to monitor the solar infrastructure rather than surrounding properties or public areas.

4.5.46 The CCTV system would use infrared technology and would not require permanent security lighting. Some poles may carry more than one camera where this is necessary to monitor separate sections of the Site.

Drainage

4.5.47 The solar panels would not form a continuous impermeable surface. Rainfall would pass through the gaps between modules and fall onto the vegetation beneath and between the panel rows.

4.5.48 A grass and vegetation cover would be maintained to promote infiltration, reduce runoff and limit the potential for soil erosion or rilling.

4.5.49 Access tracks and compounds would use permeable construction wherever practicable. Transformer stations, switchgear buildings and the substation would drain to stone surrounds, filter drains or other appropriate local drainage measures.

4.5.50 Any limited foul-water provision associated with operational welfare facilities would be contained and managed through an appropriate sealed system or other arrangement agreed as part of the detailed design. There would be no routine discharge of foul water to the surrounding drainage network.

Lighting

4.5.51 No permanent lighting would be installed within the solar-panel areas.

4.5.52 Limited low-level lighting may be installed above access doors or within the operational compound. It would be controlled by passive infrared sensors or manual switches and used only where necessary for maintenance, security or emergency purposes.

4.5.53 Lighting would be directed downwards and designed to minimise glare, sky glow and spill onto surrounding habitats, properties and public routes. No part of the Proposed Development would be continuously illuminated during normal operation.

Landscape and Ecological Infrastructure

4.5.54 The landscape and ecological proposals are shown on the Illustrative Landscape Masterplan and described in Section 4.3. They would include:

i) retention and management of existing hedgerows, trees, woodland, reens and ditches;
ii) more than 11 km of new native hedgerow and tree planting;
iii) native woodland and specimen-tree planting;
iv) a community orchard;
v) approximately 43.3 ha of diverse wildflower meadow;
vi) approximately 16.5 ha of dedicated lapwing habitat;
vii) habitat measures for shrill carder bee; and
viii) bird and bat boxes, insect hotels, hibernacula and log piles.

4.5.55 The landscape and ecological measures would form an integrated green infrastructure network connecting retained and newly created habitats across the Site.

4.5.56 Detailed planting specifications, establishment measures, management requirements and monitoring arrangements would be set out in the Landscape and Ecology Management Plan.

Public Rights of Way and Permissive Paths

4.5.57 Existing Public Rights of Way and green lanes crossing the Site would be retained and incorporated into the green infrastructure framework.

4.5.58 Approximately 5 km of existing footpaths and green lanes would be improved through measures including management, signage, surfacing where appropriate and the provision of wider landscaped corridors.

4.5.59 Approximately 3.3 km of new permissive paths would also be provided, creating additional recreational connections through and around the Site.

4.5.60 Fencing, planting and appropriate separation would be used to provide safe and attractive routes while maintaining the security of the solar infrastructure.

Grid Connection

4.5.61 Electricity would be exported from the onsite substation to the Grid Supply Point at Uskmouth Power Station through an underground grid connection of approximately 10 km.

4.5.62 The grid-connection cable would principally be installed within the existing highway boundary, either beneath the carriageway or within adjacent verges and footways. The indicative route would extend:

i) from the Site to Bishton Road and south through Bishton;
ii) west along Bishton Road to Station Road;
iii) north along Station Road and Cot Hill;
iv) west to the Southern Distributor Road;
v) southwest along the Southern Distributor Road towards Nash Road;
vi) west along West Nash Road; and
vii) into Uskmouth Power Station.

4.5.63 Towards Uskmouth, sections of the route would pass within the existing highway adjacent to or within the Gwent Levels – Nash and Goldcliff SSSI and adjacent to an approximately 200 m section of the Newport Wetlands SSSI. Construction within these sections would remain confined to the approved highway working area and would be subject to the environmental controls identified through the biodiversity and hydrology assessments.

4.5.64 The grid connection would be wholly underground, with no permanent above-ground infrastructure required along the route outside the onsite substation compound.

4.5.65 Cable ducts would generally be installed within a trench approximately 1 m deep and 0.7 m wide. The ducts would be placed on protective bedding material, covered and surrounded by further protective material and the trench reinstated using the excavated material. An indicative cross-section is shown in Image 4.4.

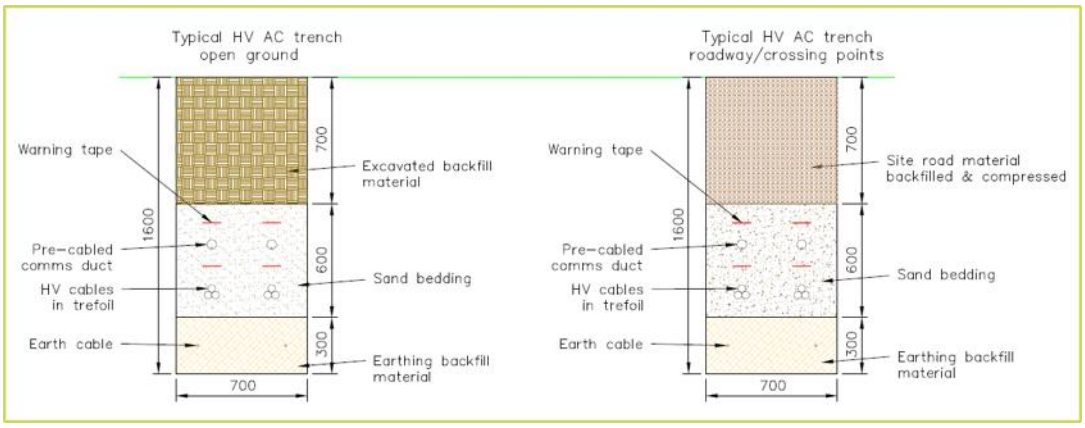

Image 4.4 Indicative Grid-Connection Cable Trench Cross-Section

4.5.66 The precise duct configuration and reinstatement specification would be established through detailed design and the relevant highway approvals.

4.5.67 A temporary working area approximately 3 m to 4 m wide would generally be required for excavation, machinery access and short-term storage of excavated material.

4.5.68 Temporary traffic-management measures, including lane restrictions, diversions or short road closures, may be required during cable installation. These would be agreed with the highway authority and managed through the CTMP and any separate highways approvals.

4.5.69 The component descriptions and parameters set out above form the basis of the assessments contained within this ES. The revised scheme comprises fixed solar arrays, string inverters and associated transformers without the BESS or central inverter stations included within the Previous Application.

4.6 Construction of the Solar Farm

4.6.1 This section describes the anticipated construction programme, activities and methods for the Proposed Development. The description is indicative because the detailed programme and working methods would be developed by the appointed

contractor. It nevertheless establishes the reasonable construction scenario assessed within this ES.

4.6.2 Construction would be undertaken in accordance with the final Construction Environmental Management Plan ('CEMP'), Construction Traffic Management Plan ('CTMP') and other controls described in Section 4.4.

Construction Programme

4.6.3 The timing of construction would depend on the grant of planning permission, discharge of any relevant planning conditions, procurement of equipment, appointment of the principal contractor and prevailing weather and ground conditions.

4.6.4 Construction is anticipated to take approximately 36 to 52 weeks, including testing and commissioning. Activities would be phased across the Site, and not all construction areas would be active simultaneously.

4.6.5 The principal construction activities would comprise:

i) pre-construction surveys and establishment of environmental protection measures;
ii) establishment of temporary construction compounds and welfare facilities;
iii) construction and improvement of Site accesses and internal access tracks;
iv) installation of deer and stock fencing, gates and temporary security measures;
v) installation of solar-panel support frames and photovoltaic modules;
vi) installation of string inverters and transformers;
vii) excavation and installation of onsite electrical cable trenches;
viii) construction of the substation compound and installation of the substation, switchgear buildings and associated electrical equipment;
ix) installation of CCTV poles, cameras and communications equipment;
x) installation of the underground grid connection to Uskmouth Power Station;
xi) testing and commissioning of the generating and electrical infrastructure;
xii) reinstatement of temporary working areas;
xiii) cultivation, seeding and landscape planting; and
xiv) installation of ecological enhancement features.

4.6.6 The precise sequence of these activities may vary between different parts of the Site. Early works would generally focus on access, compounds and environmental protection, followed by the installation of generating and electrical infrastructure and subsequent landscaping and reinstatement.

Construction Hours

4.6.7 Construction activities would generally take place during the following hours:

i) 08:00 to 18:00 Monday to Friday;
ii) 08:00 to 13:00 on Saturdays; and
iii) no construction work on Sundays or Public Holiday.

4.6.8 Activities outside these hours would only take place where necessary for reasons such as electrical commissioning, emergency works, delivery restrictions or completion of a time-sensitive operation. Any such works would be managed to minimise disturbance and undertaken in accordance with the requirements of the planning permission.

4.6.9 Any piling operations would be limited to between 08:00 and 17:00, Monday to Friday only, and not on Saturday, Sunday or Public Holidays.

Site Access and Compounds

4.6.10 Construction traffic would use the access routes and Site entrances identified within the CTMP. Deliveries would principally approach from the strategic and classified highway network before using the approved local routes to the Site.

4.6.11 Two principal temporary construction compounds are proposed on land to the east and west of Bishton Road. These would act as the main delivery, storage and workforce facilities and would reduce the need for Heavy Goods Vehicles to travel repeatedly between individual field parcels.

4.6.12 The indicative locations of the principal compounds and their associated access points are shown in Image 4.5. The final arrangements would be confirmed through the CTMP and detailed construction planning.

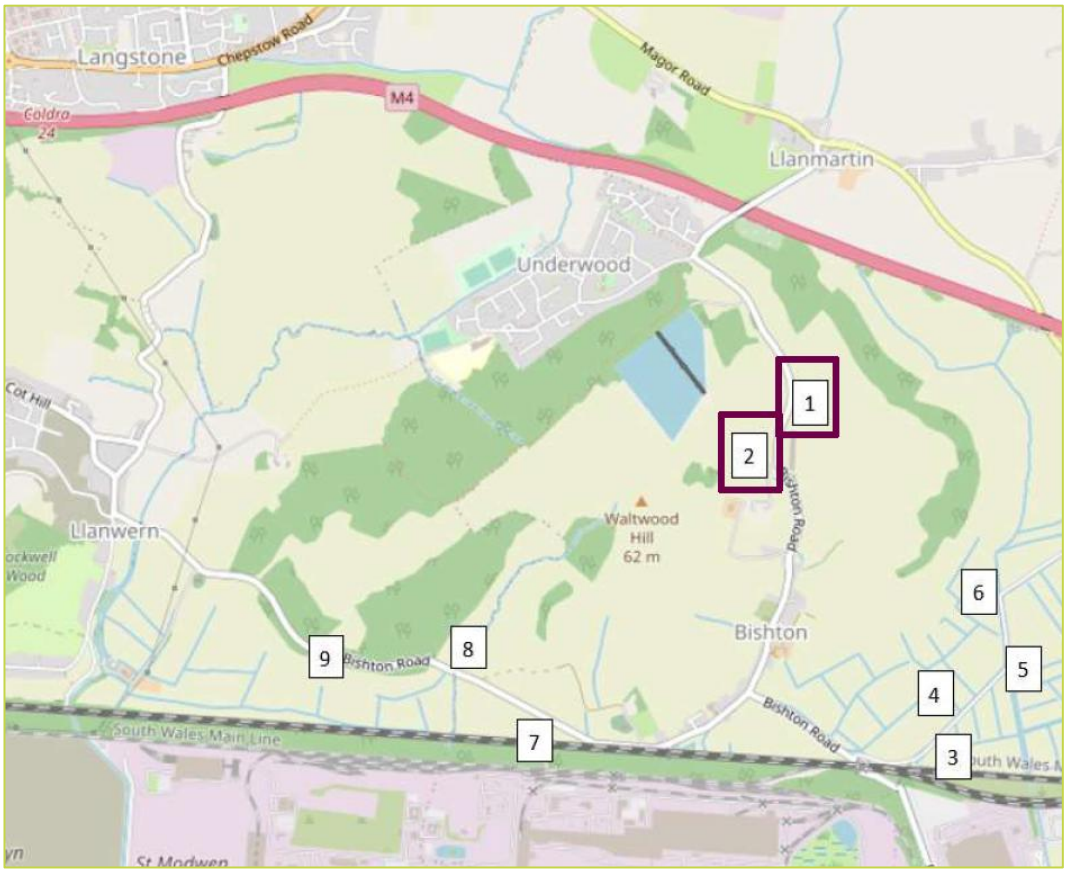

Image 4.5 Location of access points for main construction compounds

4.6.13 The compounds would generally be accessed using existing agricultural or commercial entrances, including accesses associated with the existing egg-production unit and Castle Farm Dairy, subject to the final highway design and approval.

4.6.14 Each principal compound would typically occupy an area of up to approximately 75 m by 75 m. Temporary ground-protection matting, permeable stone or a comparable construction method would be used, depending on ground conditions and the duration and intensity of use.

4.6.15 An indicative construction-compound arrangement is shown in Image 4.6.

Image 4.6 Typical construction compound layout

4.6.16 The compounds would provide:

i) temporary Site offices, meeting rooms and welfare facilities;
ii) workforce parking;
iii) delivery reception and vehicle-turning areas;
iv) equipment and material storage and laydown areas;
v) secure storage for fuels, oils and chemicals;
vi) waste-segregation and storage areas;
vii) plant and machinery parking;
viii) wheel-cleaning facilities; and
ix) security fencing and controlled access.

4.6.17 Fuels, oils and chemicals would be stored within secure and appropriately bunded areas. Refuelling would be undertaken at designated locations in accordance with the pollution-prevention measures contained within the CEMP.

4.6.18 Where practicable, materials received at the principal compounds would be transferred to individual construction areas using internal access tracks and suitable smaller vehicles, including tractors and trailers. Direct delivery to individual parcels may be required for fragile, oversized or specialist equipment but would be minimised.

4.6.19 Construction staff would park at designated compound areas. Car sharing, contractor minibuses and other measures to reduce individual vehicle journeys would be promoted through the Construction Phase Travel Plan.

4.6.20 Once construction was complete, the temporary compounds would be removed. The affected land would be reinstated to its former condition or established in accordance with the approved landscape and ecological proposals.

Construction Plant

4.6.21 Construction plant is likely to include:

i) small-scale GPS-controlled piling rigs;
ii) tracked or wheeled excavators;
iii) dumpers and rollers;
iv) trenching equipment;
v) telehandlers and forklifts;
vi) tractors and trailers;
vii) cranes or vehicle-mounted lifting equipment for transformers, switchgear and substation components;
viii) compactors and access-track construction equipment;
ix) concrete delivery vehicles; and
x) mobile task lighting where necessary.

4.6.22 The precise number and type of plant would vary according to the construction activity and programme. Plant would be maintained in good working order and operated in accordance with the noise, emissions and environmental controls contained within the CEMP.

4.6.23 *Site Preparation and Environmental Protection*

4.6.24 Before construction began, pre-construction surveys and an environmental walkover would be undertaken in accordance with the CEMP. These would confirm the locations and condition of sensitive ecological, arboricultural, archaeological and drainage features.

4.6.25 Temporary fencing and signage would be installed to identify and protect:

i) retained trees, hedgerows and woodland;
ii) reens, ditches and associated buffers;
iii) ecological mitigation and habitat areas;
iv) archaeological no-dig areas and other sensitive remains;
v) Public Rights of Way and controlled crossing points; and
vi) areas outside the approved construction footprint.

4.6.26 Temporary Heras fencing or similar would be used around construction compounds and active work areas until the permanent deer and stock fencing had been installed and the relevant parts of the Site secured.

4.6.27 Vegetation clearance would be minimised and undertaken in accordance with the ecological controls and seasonal restrictions identified in the CEMP and biodiversity assessment.

Access Tracks and Fencing

4.6.28 Existing farm tracks, field entrances and gateways would be used wherever practicable. New or improved access tracks would be constructed using permeable crushed stone over a geotextile or geogrid layer, as described in Section 4.5.

4.6.29 Excavated soil would be retained within the Site and reused where practicable. Topsoil and subsoil would be stripped, stored and reinstated separately to preserve the existing soil profile.

4.6.30 Permanent deer and stock fencing and access gates would be installed around the solar-panel areas. The sequence of fencing installation would be coordinated with ecological requirements and the need to maintain agricultural and public access.

Installation of Solar-Panel Frames

4.6.31 The solar-panel support posts would generally be installed by small-scale GPS-controlled piling rigs. A typical machine is illustrated in Image 4.7.

Image 4.7 Typical GPS Solar Farm Pile Driver

4.6.32 Posts would normally be driven to a depth of approximately 1 m to 2 m, depending on ground conditions and structural requirements. Trial piling or pull-out testing may be undertaken before full installation begins.

4.6.33 Piling would not be used where intrusive works are restricted because of archaeological remains, utilities or other identified constraints. Alternative surface-mounted or shallow-foundation methods would be used in those locations where necessary.

4.6.34 Cross-members would be attached to the installed posts to form the supporting tables. Photovoltaic modules would then be mechanically fixed to the frames and connected into strings.

4.6.35 Components would be delivered in a partly prefabricated form wherever practicable, reducing onsite assembly, waste generation and the duration of individual construction activities.

String Inverters and Transformers

4.6.36 String inverters would be installed on or close to the solar-panel support frames. Their installation would involve relatively limited ground works compared with the central inverter stations included within the Previous Application.

4.6.37 Transformers would be installed at the locations shown on the Proposed Site Layout. Foundations would generally comprise concrete sleepers, small slabs or another suitable arrangement determined through detailed design.

4.6.38 Transformers would be delivered using suitable Heavy Goods Vehicles and positioned using cranes, telehandlers or vehicle-mounted lifting equipment.

4.6.39 ***Onsite Electrical Cabling***

4.6.40 Cable trenches would generally be excavated alongside access tracks, field boundaries and fence lines. Topsoil and subsoil would be stored separately beside the trench and reused during reinstatement.

4.6.41 Cable ducts, earthing cables and communications infrastructure would be installed on appropriate bedding material and protected before the trenches were backfilled.

4.6.42 Trenches would be reinstated progressively following installation and testing. The original soil sequence would be restored and affected areas cultivated and seeded in accordance with the landscape and ecological proposals.

4.6.43 Surface-mounted or otherwise non-intrusive cable arrangements may be used within archaeological no-dig areas or other locations where excavation is restricted.

Substation and Switchgear Infrastructure

4.6.44 Construction of the operational compound would involve preparation of the compound surface, installation of drainage and foundations and erection of security fencing and gates.

4.6.45 Foundations for the substation, switchgear buildings, transformers and associated infrastructure would comprise slabs, concrete sleepers or other suitable structures determined through detailed design.

4.6.46 Larger electrical components would be delivered to the Site and installed using suitable lifting equipment. Deliveries would be scheduled and managed through the CTMP.

4.6.47 The electrical equipment would then be connected to the onsite cable network and grid connection before testing and commissioning.

Grid Connection

4.6.48 The underground grid connection would generally be installed using open-cut trenching within the highway boundary. Construction would proceed in sections to limit the length of highway affected at any one time.

4.6.49 ***The works would typically comprise:***

i) establishment of temporary traffic management;
ii) cutting or removal of the existing surface;
iii) excavation of the cable trench;
iv) installation of ducts and protective bedding;
v) backfilling and compaction;
vi) reinstatement of the highway, verge or footway;
vii) pulling electrical cables through the installed ducts; and
viii) jointing, testing and commissioning.

4.6.50 Temporary lane restrictions, traffic signals, diversions or short road closures may be required. These measures would be agreed with the relevant highway authority and coordinated to maintain access to properties and businesses wherever practicable.

4.6.51 Environmental controls would be applied where the grid route passes within or adjacent to designated sites, watercourses or other sensitive receptors. These would include measures for pollution prevention, soil and material management and protection of habitats and drainage features.

Construction Lighting

4.6.52 Temporary lighting would only be used where necessary for health, safety, security or completion of a particular construction activity during periods of low natural light.

4.6.53 Lighting would comprise directional task lighting mounted on mobile or temporary supports. It would be positioned and operated to minimise glare, sky glow and light spill onto residential properties, public routes and sensitive habitats.

Landscaping and Ecological Works

4.6.54 Landscape and ecological works would be undertaken at appropriate stages of the construction programme and during the first suitable planting seasons.

4.6.55 The works would include:

i) hedgerow, tree, woodland and orchard planting;
ii) cultivation and establishment of wildflower meadow and other grassland;
iii) preparation and management of the dedicated lapwing habitat;
iv) restoration of temporarily disturbed field margins and drainage features;
v) establishment of the landscaped Public Rights of Way and permissive-path corridors; and
vi) installation of bird and bat boxes, insect hotels, hibernacula, log piles and other ecological features.

4.6.56 Planting and habitat-establishment works would be implemented and subsequently managed in accordance with the LEMP.

Testing, Commissioning and Reinstatement

4.6.57 Once installation was complete, the solar panels, string inverters, transformers, switchgear, substation, monitoring systems and grid connection would be tested and commissioned.

4.6.58 Temporary fencing, surplus materials, plant and equipment would then be removed. Construction compounds and other temporary working areas would be restored, unless required for permanent operation.

4.6.59 Any damage to retained vegetation, access routes, drainage features or other land arising from construction would be repaired or reinstated in accordance with the CEMP and approved restoration measures.

4.6.60 The construction methods described above, together with the controls contained within the CEMP and CTMP, form the basis of the construction-phase assessments presented within this ES.

4.7 Operation of the Solar Park

4.7.1 Once the Proposed Development is constructed access to the Site would be limited to routine solar maintenance and landscape management operations. The Proposed Development would not be permanently staffed. Maintenance access to the Site would be by a small van or similar.

4.7.2 Should more major repairs be required, such as the replacement of transformer stations, more staff and specialist equipment (cranes and low loaders) would be required. This is not anticipated to be a regular occurrence.

4.7.3 The main operational noise would be associated with the centralised inverters, substation, and BESS containers. These noise levels have been determined to be not significant through the design process, with levels emitted by fixed plant predicted to be below background noise levels at sensitive receptors. Further information on noise from fixed plant is included in Appendix 3.2 of this ES.

4.7.4 As set out above the main activity during the operational phase of the development would be sheep grazing below the solar panels and/or periodic mowing or other landscape maintenance. This would retain most of the Site in productive agricultural use.

Image 4.8 Continuation of sheep farming with solar panels

4.8 Decommissioning

4.8.1 After 40 years, the majority of the Proposed Development would be decommissioned and the Site would be returned to solely agricultural use, unless a new planning application is forthcoming. Decommissioning would require similar plant to the construction phase and would result in very similar traffic impacts.

4.8.2 With the exception of the on-site substation and associated access track, all above and below ground infrastructure would be removed from Site and, where practicable, would be recycled. The substation and associated access track would be adopted by the DNO upon commissioning and would therefore be removed by the DNO should it be considered surplus to requirements.

4.8.3 Following decommissioning at the end of the Proposed Development's operational life or when panels need to be replaced due to failures/damage, solid waste will be created. Solar panels comprise a high proportion of glass along with smaller amounts of aluminium and other metals. Around 99% of materials used will be recyclable. As the solar industry expands the recycling market is following. There are an increasing number of specialist recycling firms that are developing technologies to allow the photovoltaic cells to be more easily recycled, enabling an even greater proportion of the solar panels to be recycled. In addition, support frames, fencing, CCTV poles and cabling all contain recyclable materials and stone/concrete can be processed for use as secondary aggregate.

4.8.4 Solid waste generated by decommissioning works can therefore be effectively managed by moving waste up the waste hierarchy through recycling for beneficial use. As such significant effects associated with disposal of waste as a result of the Proposed Development would not occur.

Appendix 4.1 Draft Outline Construction Environmental Management Plan

Appendix 4.2 Construction Traffic Management Plan

Appendix 4.3 Draft Landscape and Ecology Management Plan