Candwr Solar Farm

Pre Application Consultation

Environmental Statement

Chapter 4: Proposed Development and Alternatives

2 July 2026

TotalEnergies

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4. Proposed Development and Alternatives

4.1. Introduction

4.1.1. This chapter of the ES sets out the description of the Proposed Development, indicative construction methodology and identifies the main alternatives to the Proposed Development that have been considered and the main reasons for selecting the chosen option.

4.1.2. This ES Chapter is supported by the following figures:

- **Figure 4.1 – Indicative Site Layout** (PL-01.1 Rev 11)
- **Figure 4.2 - General Arrangement Drawings**, comprising –
    - Solar PV Array (PEG002-SD-04_rev03 - PV Array)
    - Transformer Station (PEG002-SD-01_rev03 - Transformer Station)
    - String Inverter (PEG002-SD-02_rev03 - String Inverter)
    - MV Station (PEG002-SD-03_rev04 - MV Station)
    - Solar PV Array (PEG002-SD-04_rev03 - PV Array)
    - Access Track (PEG002-SD-05_rev04 - Access Track)
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    - Perimeter Fence (PEG002-SD-07_rev04 - Perimeter Fence)
    - Construction Compound (PEG002-SD-08_rev01 - Construction Compound)
    - Construction Compound Cross Section (PEG002-SD-09_rev01 - Construction Compound Sections)
    - Indicative Pile (PEG002-SD-10_rev01 - Indicative Pile)
    - Indicative Culvert (TEN-SD-01_rev01 - Indicative Culvert)
    - Cable Trench Cross Sections (TYPICAL 001-02 33kV-2 CIRCUIT / TYPICAL 001-02 132kV-1 CIRCUIT)
    - Substation (TECRF-14.13-PE-GA-ELV-019 Rev 5/ COURTFARM 132KV ELEAVTION REV1 / TECRF-14.13-PE-GA-33-003 Rev 3 / TECRF-14.13-PE-GA-33-004 Rev 4/ TECRF-14.13-PE-GA-11-003 Rev 3/ COURTFARM 33/11KV ELEVATION REV2

- Acoustic Barrier (PEG-002 SD-12 01)

- **Figure 4.3 – Site Selection Assessment Plans**

- **Figure 4.4 – Indicative HDD & Culvert Crossing Plan** (PEG-002 PL-02 03)

4.2. Proposed Development

4.2.1. The Proposed Development comprises a Development of National Significance application for:

"An installation and operation of ground mounted solar photovoltaic arrays with all associated works, equipment and necessary infrastructure"

4.2.2. This Proposed Development description is used to inform the environmental assessments which are detailed in ES Chapters 5 – 12.

4.2.3. This solar photovoltaic electricity generating station (or 'solar farm') would have an export capacity of approximately 46 mega-watts (MW). The electricity generated would be enough to power the equivalent of up to 18,000 medium household occupancy of 3 people per year (electricity only basis), helping to cut carbon emissions and support the transitions away from fossil fuels. The Proposed Development would deliver a net reduction of approximately 193,000 tonnes of carbon dioxide equivalent over its lifetime, through the displacement of fossil fuel-derived electricity with renewable solar generation.

4.2.4. The primary objective for the proposal would be to supply Dŵr Cymru Welsh Water Court Farm Treatment Works with renewable energy via a direct private wire connection. The remainder will be exported to the National Grid via connection to the existing 132kV overhead line at Dŵr Cymru Welsh Water Court Farm Treatment Works. The complete project would provide 100% clean and stable energy directly to the grid for Dŵr Cymru Welsh Water wider estate, helping to meet Government and company targets for carbon neutrality. The partnership with the Applicant will support the delivery of critical national infrastructure within the area by enabling Welsh Water to reduce reliance upon the National Grid and provide protection from fluctuating energy prices. The proposal will assist with mitigating customer bills at a time of high inflation.

4.2.5. It should be noted that the Proposed Development (the solar farm) does not constitute an enabler of, nor is it functionally interdependent with Dŵr Cymru Welsh Water Court Farm Treatment Works. Dŵr Cymru Welsh Water Court Farm Treatment Works is an existing, standalone operation that is capable of continuing to operate independently of the Proposed Development. Therefore, Dŵr Cymru Welsh Water Court Farm Treatment Works does not form part of the Proposed Development as defined for EIA purposes and is not included within the scope of the application or the ES. The ES therefore assesses the environmental effects of the solar farm as a standalone project, consistent with the development for which consent is being sought.

4.2.6. Key components of the Proposed Development include:

- Solar photovoltaic ("PV") fixed panels mounted on a simple metal framework,
- Onsite supporting equipment including string inverters, transformers and MV Stations,
- Onsite 132 kilovolt ("kV") substation compounds including transformers, switchgear, circuit breakers, control equipment buildings, control functions, material storage, parking, as well as wider monitoring and maintenance equipment,
- 132kV overhead wires coming from the existing electricity pylon (owned by National Grid Electricity Distribution ("NGED")) to the onsite 132kV substation,
- Underground cable connections to connect and transmit electricity from the solar PV panels to the National Grid Electricity Distribution point of connection at the Dŵr Cymru Court Farm Water Treatment Works,
- Perimeter fencing (deer proof) and access gates around the perimeter of the Site,
- Inward facing infrared CCTV system,
- Associated internal access tracks within the Site,
- Relevant communications and monitoring equipment,
- Temporary construction compounds during the construction phase,
- Environmental mitigation and enhancement measures, including landscaping, habitat management and biodiversity enhancement,
- New permissive path walkways,
- Associated infrastructure including parking, lighting, drainage infrastructure, storage containers, earthworks, culverts, surface water management, maintenance and welfare facilities, security cabins and any other works identified as necessary to enable the development, and
- Creation of new or improvement of existing vehicular accesses for the construction, operational and decommissioning phases of the Proposed Development, predominantly utilising existing farm access points.

4.2.7. The Proposed Development site layout is shown on **Figure 4.1 -Indicative Site Layout**, with mitigation measures (landscape, ecology and drainage) detailed on **Figure 5.5 – Indicative Landscape Strategy.**

4.2.8. The total developable area of the Site (including solar pV panelled areas, onsite 132kV substation compounds and access tracks) is 47.58ha. This equates to approximately 36.1% of the Application Site area.

4.2.9. Detailed technical drawings of the various Proposed Development components are provided at **Figure 4.2 - General Arrangement Drawings.**

4.2.10. The Point of Connection ("PoC") for the Proposed Development would consist of an underground cable connection between the Land Parcels to the National Grid Electricity Distribution point of connection at the Dŵr Cymru Court Farm Water Treatment Works within the Site, connecting into the 132kV overhead power lines passing through the Site.

4.2.11. Temporary planning permission is sought for a period of circa 40 years from the date of energisation. Subject to obtaining the necessary consents, construction of the Proposed Development is anticipated to commence in 2029, and to be completed and the Proposed Development fully operational in 2031.

4.2.12. Following cessation of energy generation and exportation of the Proposed Development, the Site would be restored back to full agricultural use with all equipment and below ground connections removed. The exception is the proposed onsite 132kV substation (and ancillary security measures around the substation compound e.g., perimeter fencing, lighting and CCTV equipment) and associated access to the onsite 132kV substation and compound will be retained on a permanent basis as this would remain as part of the essential National Grid distribution network infrastructure.

4.2.13. Depending on the depth of the cabling, some may be capped off from the local electricity network and left in-situ rather than removed via trenching. Returning the main solar farm site to its former agricultural use, it is recognised some elements of the landscaping may have to be removed. However, it is assumed the established habitats such as any tree and hedgerow planting, the intention would be retained when handed back to landowners, who would then have the ability to do as they wish (within the restrictions of the planning system) with their land. It is anticipated that decommissioning of the Proposed Development would be controlled by planning condition.

4.3. Design Parameters

4.3.1. The design of the Proposed Development has been refined throughout the EIA process. It is recognised that parts of the Proposed Development design and construction methodology, as presented, may be subject to further refinement and optimisation prior to and during construction. This is very pertinent to solar development due to the rapid pace of change in technology. For example, as technology advances, it is possible that solar PV panels could become more efficient, which could result in a potential reduction in total panel area required to deliver the same amount of generation.

4.3.2. This EIA has adopted a Rochdale Envelope approach, whereby the likely significant environmental effects of the Proposed Development have been assessed based on defined maximum (or minimum, where appropriate) design parameters. This 'worst-case' scenario approach allows for a degree of flexibility in the final design, recognising that certain elements of the scheme may evolve through detailed design and procurement. The **Indicative Site Layout** (**Figure 4.1**) is therefore illustrative, with the final layout and

construction phasing to be secured by planning condition agreed with by the Local Planning Authorities (LPA's) following the grant of planning permission. The final detailed layout will demonstrate how the final 'as-build' design remains within the parameters of the design principles considered by this ES.

Buffer Zones

4.3.3. A number of buffer zones have been established to protect valuable natural resources, including trees and ecologically important field margins. The following minimum buffers have been adopted as standard as part of the design of the Proposed Development:

- Existing 33kV (or lower) overhead Power Lines: 6m easement either side
- Existing 132kV overhead Power Lines: 30m square exclusion zone from the base of the pylon, 20m easement either side.
- Existing underground low voltage Electricity Lines: 3m easement either side
- Existing Telecom Lines: 6m easement either side.
- Existing Gas Lines: 5m easement either side.
- Existing Water Mains: 3m easement either side.
- Existing Sewer Surface Water: 3m easement either side.

4.3.4. Watercourses: 7m easement either side.

- Ancient Woodland to fence line: 15m
- Smaller Vegetation and Root Protection Areas (RPA) to fence line: 5m.
- Established Vegetation to fence line: 10m.
- Fence line to panels: 3.5m
- 30m from any badger setts

4.4. Components of the Proposed Development

4.4.1. The design parameters for each component of the Proposed Development are detailed within the following sections. These have been used to inform the assessment detailed within this ES.

Solar PV panels and framework

4.4.2. The solar PV panels generate electrical power by converting solar irradiance into direct current (DC) electricity. A solar PV panel consists of a layer of silicon cells, an anodised

aluminium frame and various wiring to allow current to flow from the silicon cells. Silicon is a non-metal with conductive properties that allow 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. Solar PV panels are proposed in Land Parcels 1-13 as shown in **Figure 4.1 – Indicative Site Layout**.

4.4.3. The solar PV panels are likely to have a typical maximum height of approximately 2.85m, however, for the purposes of the EIA, a worst-case height of 3m has been assumed in accordance with the Rochdale Envelope approach. This ensures that the assessment remains robust should panel dimensions increase during detailed design or procurement as a result of advances in solar technology. The panels will be mounted on a fixed framework, with a minimum clearance of 0.8m AGL to the lowest edge, set at a tilt of 15–30° facing south, and spaced between 1.5–4.5m between rows to respond to local topography.

4.4.4. For the fixed system the mounting structure will be supported at intervals by double mounted posts. The posts will be pile driven into the ground with a small plant rig, to depths of up to 2.5m and this will be guided by localised ground conditions. The rest of the mounting frame would then be fitted to the posts to create angled support tables ready for the solar PV panel installation.

4.4.5. Depending on ground conditions, the posts may be mounted to ballast slabs. If any areas of archaeological interest are identified within the work area, then consideration will be given to the use of non-intrusive installation method, where the posts will be fixed into concrete pads resting on top of the ground. However, there is currently no identified need for this method within the site.

4.4.6. The solar PV panels would be preconstructed to help minimise on-site construction activity.

4.4.7. The solar PV panels will be connected in strings and insulated cabling will be routed in channels fixed on the underside of the mounting frame. The string cables will run along the entire underside of each row and connected to string inverters at the end of rows, before being taken below ground.

4.4.8. Land between and beneath the solar PV panels would be used for biodiversity enhancements and potential for seasonal sheep grazing for maintenance. Mechanical cutting may also be deployed to manage the grass.

4.4.9. An illustrative figure for the solar PV panels is provided at **Figure 4.2- General Arrangement Drawings**.

String Inverters, MV Stations and Transformers

4.4.10. String inverters take direct current (DC), as generated by the solar PV panels, and convert it into alternating current (AC) to enable the on-site generated electricity to be

transferred to the on-site substation and in turn to the local electricity distribution network. The design of string inverters varies between manufactures, but they are typically approximately 1.1 m wide × 0.9 m high × 0.4 m deep and attach to the end of panel rows. An approximate 173 inverters are anticipated to be spread across the solar PV panelled areas (Land Parcels 1-13).

4.4.11. An illustrative figure for the string inverters is provided at **Figure 4.2- General Arrangement Drawings**.

4.4.12. The Proposed Development requires the installation of 16 MV Stations co located with 16 Transformers. These are distributed across Land Parcels 1-13 as shown **in Figure 4.1 – Indicative Site Layout.** The MV Stations and Transformers handle electricity at medium voltage levels and increase the voltage of the electricity generated by the solar panels before it reaches the on-site substation and ultimately the distribution network.

4.4.13. The Transformers comprise individual containers (approximately 6m long × 2.4 m wide x 2.9 m high). The MV stations would be approximately 2m long, x 1m wide x 1.8m high). An illustrative figure for the MV Stations and Transformers is provided at **Figure 4.2- General Arrangement Drawings**.

4.4.14. Due to the continuing advances in solar technology, it is not possible to specify the precise type of inverter, MV station or Transformer at this time, as this will depend on the detailed electrical design and competitive procurement process. However, final details could be controlled through suitably worded planning conditions requiring the final details to be submitted for approval.

Electrical Cabling

4.4.15. On-site cabling would be required to connect the solar PV panels to the string inverters, MV Stations/Transformers, and the onsite 132kV substation. As mentioned above, the solar PV panels will be connected in strings and insulated cabling will be routed in channels fixed on the underside of the mounting frame. The string cables will run along the entire underside of each row and connected to string inverters at the end of rows, before being taken below ground.

4.4.16. The 33kv electrical cabling from the arrays would be laid by open trench technique, concealed in shallow trenches linking the solar panels to the inverters / transformers and then to the 132kV onsite substation. The dimensions and depth of the trenches would vary depending on the amount of cabling and ground conditions, typically they would be minimum 1m in depth and 4.7m wide. The cable trench may also carry earthing and communications cables and will be backfilled with fine sands and excavated materials to the original ground level.

4.4.17. The underground cabling connecting the 132kV onsite substation to the existing overhead 132kV powerline would be laid by open-cut trench. At the pointy of connection, there may be upgrade works required to the existing pylon to facilitate the connection works.

4.4.18. The construction process will follow a soil management plan to ensure that the soil structure and quality are not degraded as part of the construction process, an **Outline Soil Management Plan** is submitted as part of the DNS application.

4.4.19. The underground cables will be located in existing gaps in hedgerows wherever feasible, however this assessment assumes the loss of some hedgerows as a worst case. Hedgerows to be removed are included within **Appendix 5.10 -Arboricultural Impact Assessment**.

4.4.20. Some of the underground cabling will be routed a short distance south of Land Parcel 10 within the public highway, either in the carriageway or adjacent footways, to connect into the onsite 132kV substation adjacent to the Dŵr Cymru Welsh Water Treatment Works. Additionally, a short distance between Land Parcl 3 and Land Parcel 10 is proposed to have underground cabling connecting the Land Parcels located within the public highway (Candwr Road).

4.4.21. The electrical cabling would all be located underground and there would be no above ground infrastructure required other than within the onsite 132kV substation compound to connect to the 132kV overhead wires coming from the existing electricity pylon adjacent to the onsite 132kV substation compound.

4.4.22. It is anticipated that underground cabling would be left in-situ during the decommissioning phase to avoid unnecessary ground disturbance.

4.4.23. In some locations, there may be a requirement for a trenchless approach to the laying of cables, where open trenching is not possible. At these locations trenchless techniques, such as boring, micro-tunnelling, or moling methods are likely to be undertaken. **Figure 4.4 – Indicative HDD & Culvert Crossing Plan** shows the indicative locations for horizontal directional drill (HDD) laying of cables.

4.4.24. An illustrative figure for the typical cable trenches is provided at **Figure 4.2- General Arrangement Drawings**.

Substation Compound

4.4.25. The design provides for an onsite 132kV substation and compound, positioned on land owned by Dŵr Cymru Welsh Water adjacent to the Dŵr Cymru Welsh Water Court Farm Water Treatment Works and north of Land Parcel 8.

4.4.26. The onsite 132kV substation compound is necessary to step up the voltage of the electricity delivered by the solar PV panels from 33kV to 132kV, and connect into the National Grid and direct line to Dŵr Cymru Welsh Water Court Farm Water Treatment Works.

4.4.27. The onsite 132kV substation compound would have a footprint area in total of approximately 0.71 ha and a maximum height of 6.2m.

4.4.28. The arrangement of the 132Kv substation compound is split into 3 fenced and gated compounds connected by an access track. The arrangement has been designed to take into account constraints such as the overhead power lines, water mains, PRoW and vegetation with suitable buffers.

4.4.29. The onsite 132kV substation compound would be gated with security fencing, with a 3m high palisade fencing.

4.4.30. Except for the concrete foundations for the various equipment components, the onsite 132kV substation compound would comprise ground that would be permeable to surface water.

4.4.31. Whilst downward facing external lighting will be installed at the onsite 132kV substation compound for emergency work during hours of darkness, the substation will not be continuously lit.

4.4.32. The final design for the substation would be subject to agreement with the DNO.

4.4.33. An illustrative figure for the indicative layout of the onsite 132kV substation compound is provided at **Figure 4.2- General Arrangement Drawings**.

Access

4.4.34. The Site is served by eight access points (5x existing and 3x new), the locations of which are shown in **Draft Outline Construction Traffic Management Plan** A summary of each access point (1-8) is provided below.

4.4.35. The existing access points generally provide access to agricultural fields via field gate entrances located along unnamed rural roads, they are therefore associated with existing large agricultural vehicle movements, however, where necessary modifications will be made as outlined within **Draft Outline Construction Traffic Management Plan** submitted as part of this DNS Application.

4.4.36. The new access points (1, 6 & 7) have been designed to accommodate construction and operational traffic associated with the Proposed Development, including larger vehicles where required.

4.4.37. The primary access (Access 1) is designed to accommodate larger vehicles, including articulated HGVs, and will connect directly to an internal haul road to distribute traffic within the Site. Secondary new accesses are intended to accommodate smaller construction and maintenance vehicles, such as tractors with trailers, and provide connectivity to construction compounds and the onsite 132Kv substation.

<u>Primary Access - Access 1 (New)</u>

4.4.38. Access 1 is located off the B4236 Caerleon Road serving as the main construction access. It is designed to accommodate large vehicles (including articulated HGVs) and connects directly to the internal haul road and primary construction compound in Land Parcel 13.

Access 2 (Existing)

4.4.39. This is an existing agricultural field access from an unnamed rural road connecting into Land Parcel 4. Used for internal routing and smaller construction vehicles only (no HGVs).

Access 3 (Existing)

4.4.40. This is an existing agricultural access off an unnamed road, upgraded to improve geometry connecting into Land Parcel 10. It provides connection towards Secondary Construction Compound A in Land Parcel 10a.

Access 4 (Existing)

4.4.41. This is an existing access used to reach Land Parcel 3 off Candwr Road. Serves smaller construction vehicles only (no HGVs).

Access 5 (Existing)

4.4.42. Existing access off Candwr Road connecting to Land Parcel 8 and 12.

Access 6 (New)

4.4.43. New access from an unnamed road into Land Parcel 1. It provides connection to Secondary Construction Compound B within Land Parcel 1c and associated land parcels to the northeast.

Access 7 (New)

4.4.44. New access serving the onsite 132kv substation (point of connection) off an unnamed road.

4.4.45. Access 8 (Existing)

4.4.46. Existing agricultural field gate access from an unnamed road connecting to Land Parcel 11. Used for internal circulation and access to more remote parcels.

Access Tracks

4.4.47. Access to the Proposed Development during operation would be required for maintenance. Access to the Proposed Development is proposed through a mix of existing and new access points for each Land Parcel. Once accessing the Site, the internal access tracks will connect into the various Land Parcels.

4.4.48. The Proposed Development would utilise existing farm track routes, where practicable, with new access tracks approximately 3.5m wide, created as required. The access tracks have been located so they utilise existing field gates between fields to reduce the impact on hedgerows where practicable. MV stations and Transformers will located off a number of these internal access tracks.

4.4.49. The access track would be formed by excavating 150mm and laying clean Type 1 aggregates. This in turn, would be laid on a compacted soil base, with a depth of 350 mm.

4.4.50. An illustrative figure for the typical access tracks is provided at **Figure 4.2- General Arrangement Drawings**.

Construction Phase

4.4.51. During the construction phase, the primary construction access (Access 1) will be taken from the B4236 Caerleon Road, providing a purpose-built junction suitable for highway-capable vehicles, including articulated HGVs.

4.4.52. This access will connect directly to an internal haul road and primary construction compound, where materials will be delivered and redistributed across the Site. Secondary access points (Accesses 2–8) will support internal circulation and distribution across the Site.

4.4.53. All HGV traffic will be routed to and from the Site via Access 1, following a defined route from the strategic road network (M4/A4042), thereby avoiding the use of local rural lanes for large vehicles.

4.4.54. During the decommissioning phase, access to the Site is anticipated to follow a similar arrangement to the construction phase, with vehicle movements effectively reversing the established construction process.

Operational Phase

4.4.55. During the operational phase, all eight proposed access points will be retained and available for use by maintenance vehicles, providing flexible access across the Site.

4.4.56. Access to the Site will occur on an ad hoc basis, with maintenance visits undertaken only as required. It is anticipated that the level of activity will be low, with approximately four maintenance trips per month.

4.4.57. Vehicles accessing the Site during operation will typically comprise light vehicles such as 4x4s or small vans, rather than large construction vehicles.

4.4.58. The internal layout will allow vehicles to enter, circulate within the Site, and exit in a forward gear, avoiding the need for reversing onto the public highway.

4.4.59. Overall, the operational phase is characterised by low-frequency, small-scale vehicle movements, with the established network of access points ensuring safe and efficient access for routine maintenance without materially affecting the surrounding highway network

Public Right of Ways (PRoW)

4.4.60. Several PRoWs cross through and abut the Site, these are illustrated on. **Figure 4.1 – Indicative Site Layout.** A **Draft Outline Construction Traffic Management Plan** is submitted to assess the impact on PRoWs and to provide a management strategy for the Proposed Development. There are no proposals to alter/divert or stop-up any PRoW during the construction and operational phase. Measures such as fencing, signage, and designated crossing points may be used to manage interactions between users and construction activity.

Permissive Paths

4.4.61. Enhancements to the PRoW network within and around the Site are also proposed with additional permissive paths, as shown on the proposed **Indicative Landscape Strategy** (**Figure 5.5**). New proposed sections of permissive footpath include:

- Two sections within the southeastern corner of Land Parcel 12,
- Lengths running along the south and west of Land Parcel 7, running northeast and south of Parcel 6A and connecting to existing footpath southwest of Parcel 5 and northeast of Parcel 6B, and
- Length to the south of Parcel 3, connecting to existing footpaths to the northwest and southeast of Land Parcel 3.

Crossings

4.4.62. Where internal access tracks are required to cross a watercourse, a culvert or similar feature will be required to be installed. A typical cross section of a culvert the detail is illustrated on **Figure 4.2- General Arrangement Drawings**. **Figure 4.4 – Indicative HDD & Culvert Crossing Plan** details the locations of the watercourse crossings and proposed crossing method. The final design for watercourse crossings will be submitted at the detailed design stage prior to construction, agreed with the LPA's by way of planning condition following grant of planning permission.

Fencing and Security

4.4.63. Perimeter fencing will enclose Land Parcels as illustrated on **Figure 4.1 – Indicative Site Layout.** Fencing will be approximately deer/stock wire deer fencing approximately 2.4m in height with wooden posts piled into the ground. The fencing would be designed in such

a way to allow small animals to pass through and would also be gated to allow access to and from the Site.

4.4.64. The design of the perimeter fencing has taken into account the design constraints of utilities, with appropriate buffers. As such, the Proposed Development has been split into a series of fenced areas, which ensure access into the Proposed Development is controlled, but still enables the operators of utilities to access their assets at the Site.

4.4.65. Pole mounted Closed Circuit Television (CCTV) system, inwardly facing, will be deployed around the perimeter of the operational areas of the Site. These cameras will be mounted on poles of approximately 4m in height, located adjacent to the perimeter fencing. It is anticipated that the CCTV system would have motion detection technology for recording and pointed directly within the Site and away from any land outside of the Site.

4.4.66. No areas of the Proposed Development would be continuously lit during operation, however, security lighting would be required around key electrical infrastructure i.e. the onsite 132kV substation compound.

4.4.67. Illustrative figures for fencing and CCTV detail are provided in **Figure 4.2- General Arrangement Drawings.**

Temporary Construction Compounds

4.4.68. For the construction process only, it is anticipated that there will be up to three temporary construction compounds, in Land Parcel 1, 10 and 13 to serve the Site. The primary compound is located in Land Parcel 13 with the secondary compounds in Land Parcel 10 and 1.

4.4.69. The primary compound allows all deliveries by HGVs to be made to a centralised area, decanted and shuttled across the Site (internally) to various parcels of land using a tractor and trailer. Secondary Compound A in Land Parcel 10 serves Land Parcels 8, 10 and 12, providing localised storage and distribution. Secondary Compound A in Land Parcel 1 serves Land Parcels 1, 2 and 11, providing localised storage and distribution.

4.4.70. The temporary construction compounds would typically have a footprint of approximately 0.3 ah. The construction compounds will typically have the soil stripped to 300-400mm depth with non-woven geotextile membrane laid down filled with compacted crushed stone to allow water to percolate into the ground. The temporary construction compounds locations are illustrated on **Figure 4.1 – Indicative Site Layout.**

4.4.71. The use of the temporary construction compounds could vary depending on the construction activities, however, likely uses include storage of equipment and material, construction worker welfare facilities, and deliveries.

4.4.72. The temporary construction compounds would comprise:

- Temporary portacabins providing office and welfare facilities for construction operatives
- Heavy Goods Vehicle (HGV) / delivery turning area
- Parking area for construction and workers vehicles
- Secure compound for storage
- Temporary hardstanding
- Wheel washing facilities and associated waste water treatment systems
- Temporary gated compound
- Storage bins for recyclables and other waste

4.4.73. A typical layout of a construction compound is illustrated at **Figure 4.2- General Arrangement Drawings.**

4.4.74. At the end of the construction period the temporary construction compound would be decommissioned. During the operational phase, the areas used as temporary construction compounds phase will be returned to grassland and used for solar PV panel areas.

Drainage

4.4.75. A Flood Consequence Assessment and a Surface Water Drainage Strategy (**Appendix 9.1**) has been developed and sets out the outline drainage strategy for the Site. The documents outline how surface water will be managed in order to prevent any increase in flood risk. It describes measures to manage drainage from new infrastructure (e.g. solar PV panels, access tracks and areas of hardstanding across the Site) and manage any required changes to existing land drainage arrangements through use of sustainable drainage systems (SuDS) . The strategy will be developed into a detailed drainage strategy prior to construction.

4.4.76. Key embedded mitigation measures incorporated into the scheme design include:

- All built development (with the exception of necessary watercourse crossings and access tracks) is located within areas of lowest flood risk (Flood Zone 1), avoiding higher risk areas associated with watercourses;
- Solar panels are elevated (approximately 0.8 m above ground level) to maintain existing overland flow paths and avoid impedance of surface water movement;

4.4.77. The Proposed Development minimises impermeable area through the use of driven pile foundations and permeable access tracks, thereby limiting changes to runoff characteristics;

- A minimum 7 m easement from the top of bank of all Ordinary Watercourses is maintained free from development to enable maintenance and preserve natural hydrological function;
- The transition from intensive agricultural use to grassland beneath and around solar arrays will reduce soil compaction, increase infiltration and provide long-term hydrological betterment;
- A site-wide drainage strategy incorporating swales, permeable surfaces and attenuation features will manage runoff, maintain greenfield discharge rates and provide water quality treatment and biodiversity benefits.

4.4.78. Climate change resilience has been embedded within both the scheme design and including the application of climate change allowances in line with current Welsh Government and Natural Resources Wales requirements

4.4.79. The documents demonstrate that the Proposed Development will be safe for its lifetime (40 years) taking account of the vulnerability of its users, without increasing flood risk elsewhere.

Biodiversity and Landscaping

4.4.80. The Proposed Development presents considerable opportunity for landscape and biodiversity mitigation and enhancement. The Landscape and Biodiversity proposals are discussed in detail in the supporting **Draft Outline Landscape and Ecological Management Plan.** It sets out measures for protection, retention, and establishment of new habitats, with measures to protect the species associated with these habitats. It also sets out measures for habitat management and enhancement, alongside schedules of maintenance.

4.4.81. In general, a number of measures and features are proposed for the benefit of biodiversity. This includes the planting of new hedgerows and bolstering of existing field boundaries to increase coverage of this habitat, provide effective landscape screening, and to improve connectivity of the hedgerow and woodland network across and beyond the Site.

4.4.82. Key landscape and ecological measures that are provided within the Proposed Development include:

- Sensitive design of the Proposed Development responding to constraints and opportunities including offsets to nearby receptors;
- Minimisation of land take in higher value areas with installation of infrastructure within existing field patterns and lower value habitats;
- Retention of key habitats, including: Existing hedgerows, trees and woodland and Ancient woodland retained with buffers;

- Native transplant woodland planting, comprising shrubs, light standard and standard trees to be maintained at a minimum mature height of 6m;
- Native hedgerow tree planting within proposed and existing hedgerows;
- Orchard planting of native species;
- Native hedgerow planting;
- Wildflower, meadow and wetland meadow planting, with appropriate species/seed mixes responding to the specific ground conditions across the Site;
- Measures implemented where species are present/potentially present, including - Badger protection measures (avoidance buffers, monitoring if required), Bat-sensitive design (e.g. avoiding key commuting routes, lighting control) and protection of breeding birds (seasonal restrictions
- Safeguards for reptiles, amphibians and mammals where required; and
- Protection of watercourses and riparian corridors (e.g. Afon Lwyd) with measures to control runoff and pollution during construction

4.4.83. The final LEMP will be agreed with the LPA's by way of planning condition following grant of planning permission.

4.5. Construction Phase

4.5.1. The following section provides a summary of the key elements of the construction of the Proposed Development. Detailed consideration of potential effects during the construction process and any mitigation measures are provided in each relevant chapter of this ES.

4.5.2. Planning for construction is necessarily broad at this stage and may be subject to modification during the detailed design stage and in some instances when construction has commenced. Consequently, it has been necessary to predict some of the likely significant effects of the construction of the Proposed Development with the best possible degree of accuracy based on worst- case scenarios. The following description enables the principal construction phases and methods to be understood and assessed.

4.5.3. A **Draft Outline Construction Environmental Management Plan** has been developed for the construction phase of the development and is submitted as part of the wider DNS planning application.

Programme of Works

4.5.4. The construction phase of the Proposed Development is currently anticipated to begin in 2029 and span for up to 18 months (minimum 12 months), targeting completion and

operation in 2031; this will be dependent on the grant of planning permission for the Proposed Development, final design, and potential environmental constraints on the timing of construction activities.

Construction Activities

4.5.5. A summary of the likely construction programme is provided below, noting that many of the phases will not occur in isolation and are likely to take place concurrently:

Site Preparation

- Creation of access points onto the Site;
- The establishment of temporary construction compounds;
- Installation of security fencing, access gates, and CCTV around the Site; and Erection of deer / stock fencing and gates to Site perimeter;
- Erection of 'Heras' fencing around tree root protection areas;
- Installation of any culverts of watercourses;
- Ground clearance activities;
- Construction of the internal access roads; and
- Delivery of construction materials and plant machinery required to construct the Proposed Development.

Infrastructure Construction

- Installation of solar PV panels and frames;
- Installation of security fencing and CCTV around solar PV panelled areas;
- Installation of string inverters and inverter stations;
- Installation of electric cabling;
- Installation of onsite 132kV substation and compound;
- Grid connection; and
- Reinstatement works, where necessary.

Testing and Commissioning

4.5.6. Following construction, the Proposed Development will go through a stage of testing prior to being commissioned and the first electricity generated and supplied to the National Grid. This is likely to involve mechanical and visual inspection of the Proposed Development, as well as electrical and equipment testing.

Site Reinstatement and Habitat Creation

4.5.7. Following construction, specific elements will be removed related to the construction phase only of the Proposed Development (e.g., temporary construction compounds). These areas will be either allocated for solar pV panel infrastructure, reinstated to their use before construction began or incorporated into the proposed landscaping and ecological enhancements proposed as part of the Proposed Development.

Construction Methodology

Hours of Work

4.5.8. It is anticipated that the working hours will be as set out below:

- 07.00 – 18.00 Monday to Friday; and
- 07.00 – 13.00 Saturday
- No work on Sunday's or Bank Holidays

4.5.9. Deliveries during the construction phase will be limited to outside the typical highway network peak hours and will occur between 10:00-16:00 Monday to Friday, and between 08:00-13:00 on Saturdays. No deliveries will take place on Sundays or Public Holidays.

4.5.10. These working hours will be agreed with the relevant LPA's prior to the commencement of the works. All work outside these hours will be subject to prior agreement, and/or reasonable notice, by the relevant LPA's, who may impose certain restrictions. Night time working will be restricted to exceptional circumstances.

Construction Equipment

4.5.11. Construction equipment typically used to construct the Proposed Development included (but is not limited to):

- Excavators
- Mobile cranes
- Ready mix concrete wagons
- Concrete pumps

- Mobile piling rigs
- Dumper trucks
- Low loaders
- Power Generators
- Fuel and water bowsers
- Skips.

Construction Staff

4.5.12. The Applicant estimates that there may be up to a maximum of 150 construction staff on site per day during peak times. This number will likely be less at certain times of the construction phase, depending on the type of activity being undertaken.

Construction Control Measures

Construction Environmental Management

4.5.13. A **Draft Outline Construction Environmental Management Plan** is submitted with this DNS planning application, setting out the measures, commitments and actions identified in the ES to manage environmental effects during construction. These measures, commitments and actions would be carried forward to a detailed CEMP.

4.5.14. The CEMP would be prepared and agreed with relevant LPA's by way of planning condition following grant of planning permission and in advance of the construction phase.

4.5.15. Likely measures within the detailed CEMP to eliminate, reduce or offset adverse environmental effects are identified below:

- The broad construction programme of the phasing of the work and the construction activities,
- Details of prohibited or restricted operations (for example locations, hours of operation etc.).
- Arrangements for the implementation of the CEMP and environmental monitoring, including responsibilities, the role of environmental authorities, and participation of stakeholders.
- A monitoring and supervision plan.
- A response plan in the event of accidents or otherwise unexpected events and potential risk register.

- Locations and protocol with regard to material storage and compounds, and
- Mitigation, management measures and monitoring measures in relation to environmental disciplines.

4.5.16. The establishment of agreed methods and procedures enables any prospective departures to be identified, the reasons understood and appropriate provisions made.

Management of sub-contractors

4.5.17. Individual contracts (for example for waste removal) will incorporate relevant requirements in respect of environmental control, based largely on the standard of 'good working practice' as well as Statutory Requirements. Potential sub-contractors will be required to demonstrate how they will achieve best practice, how targets will be met and how potential effects will be minimised.

Management of Construction Works

4.5.18. Contact details will be provided at the Application Site entrance and will be provided to relevant LPA's prior to the start of site activities, and whenever a change of responsibility occurs.

Responses to Complaints

4.5.19. Any complaints will be logged, where necessary. The procedures will specify the roles and responsibilities in respect of breaches and complaints from the public. The required actions will be different in each specific case, depending on the operation, equipment or location or applying additional controls.

Prior Notice

4.5.20. In the event of unusual activities or events that can be anticipated, these will be notified to the relevant LPA's and to the relevant property owners or occupiers wherever possible and neighbours, in advance of the activity.

Construction Traffic

4.5.21. A **Draft Outline Construction Traffic Management Plan** (**Appendix x.x**) is submitted with this DNS planning application, detailing the measures to avoid and/or reduce impacts relating to construction traffic. It includes a routing strategy for construction traffic including HGVs, site access arrangements, construction vehicle movements, and peak time restrictions for HGVs where possible.

4.5.22. In regard to construction vehicle movements, it is anticipated during the peak delivery periods there could be up to two HGV deliveries per day (four-two way movements) on average. A number of construction movements associated with smaller vehicles such as fuel for plant, the collection of skips for waste management, wastewater removal, the

transport of construction workers and sub-contractors. It is anticipated the workforce trips will utilise minibuses to reduce the number of single occupancy vehicle trips by construction workers.

4.5.23. The **Draft Outline Construction Traffic Management Plan** details this level of traffic during the construction phase is not considered to be material and it is considered that this will not have a detrimental impact on the safety or operation of the local or strategic highway network.

Waste Management, Recycling and Disposal

4.5.24. Waste will be generated during all stages of the construction works. Major sources of waste within the construction process could include:

- Demolition spoil – concrete, brick rubble, steel, aluminium, plastics, wood etc.;
- Packaging – plastics, pallets, expanded foams etc;
- Waste materials generated from inaccurate ordering, poor usage, badly stored materials, poor handling, spillage etc; and
- Dirty water, for example from silt.

4.5.25. All relevant contractors will be required to investigate opportunities to minimise waste arisings at source and, where such waste generation is unavoidable, to maximise the recycling and reuse potential of demolition and construction materials. Wherever feasible, such arisings will be dealt with in a manner that reduces environmental impact and maximises potential re-use of materials. Recycling of materials will largely take place off-site where noise and dust are less likely to result in impacts to the occupants of surrounding properties.

4.5.26. For those materials removed from the Application Site, notification by the Contractor/Construction Manager for approval (via consultation with the relevant LPAs will take place. Loads will only be deposited at authorised waste treatment and disposal sites. Waste management in Wales is primarily regulated by the Environmental Protection Act 1990 supplement by Environment (Wales) Act 2016, Waste (England and Wales) Regulations 2011, Controlled Waste (England and Wales) Regulations 2012, Waste Separation Requirements (Wales) Regulations 2023, Landfill (England and Wales) (Amendment) Regulations 2004, Hazardous Waste (England and Wales) Regulations 2005 and List of Wastes (Wales) Regulations 2005.

4.5.27. To ensure that only permitted and approved excavated (waste) materials are deposited and to prevent the occurrence of fly-tipping, a waste transfer note (WTN) system including rigorous Waste Acceptance Criteria (WAC) testing will be utilised in accordance with the Environmental Protection (Duty of Care) Regulations 1991 and the Environmental Permitting Regulations 2016. All contractor/sub-contractors used for waste management operations, will hold a current waste carriers licence and will operate a WTN system, to

confirm that each load has been safely received at the approved licensed waste management disposal site and that the material matches the description on the WTN. Copies of the WTN are to be provided to the nominated manager, and available for inspection at the Application Site. In addition, direct routes via motorways/main roads to agreed disposal sites, will be approved through a Transport Plan and strictly enforced by the principal site contractor.

4.5.28. No burning of demolition or construction waste will be undertaken on the Application Site.

4.5.29. It is also expected that a Site Waste Management Plan (SWMP) would be prepared at the detailed design stage to set out the procedures to sort, reuse and recycle construction waste and would be subject to a suitably worded planning condition. Adherence to the SWMP would support better control over materials handling and waste, compliance with relevant waste legislation for the handling, transport and disposal of wastes, compliance with environmental management systems and management of waste-related costs.

Protection of Trees and Vegetation

4.5.30. Provision in BS5837: 2012 will be followed during the construction of the Proposed Development. All trees to be retained will be protected from any unnecessary damage.

4.5.31. All temporary material storage will be located wherever practical at adequate distances from vegetation and tree cover to avoid any physical damage. Where tree roots may be subject to potential vehicle compaction, additional temporary protection of the ground surface may be introduced.

Operational Phase

4.5.32. The design life of the Proposed Development is expected to be operational for a maximum of 40 years.

4.5.33. During operation of the Proposed Development, human activity on the Site will be minimal and would be restricted principally to:

- Landscaping and ecological management in accordance with the detailed LEMP,
- equipment maintenance and servicing,
- replacement of any components that fail, and
- monitoring to ensure the continued effective operation of the Proposed Development.

4.5.34. There will not be any permanent jobs on the Site. Rather than permanent staff working within the operational Proposed Development, there will be frequent visits made by off-site workers in a small van or similar to ensure that the Proposed Development is maintained properly.

4.5.35. Operational areas will be surrounded by perimeter fencing with pole-mounted CCTV cameras adjacent to the perimeter fencing for security.

4.5.36. Access to the Proposed Development during operation for maintenance activities would utilise all available access locations into the Land Parcels.

4.5.37. Land between and beneath the solar PV panels would be used for biodiversity enhancements including dedicated skylark mitigation areas and potential for seasonal sheep grazing for maintenance which would retain associate areas in productive agricultural use. Mechanical cutting may also be deployed to manage the grass. In fields dedicated to skylark mitigation enhancement, management will be typical meadow management.

4.5.38. Given the Proposed Development is operational for a maximum of 40 years, there will be a need potentially for some or all of the solar equipment to be replaced during the operational phase. The solar equipment would be disposed of following the waste hierarchy, with materials being reused of recycled wherever possible. Any electrical waste would be disposed of in accordance with the Waste from Electrical and Electronic Equipment (WEEE) Regulations 2013, minimising the environmental impact of the replacement of any elements of the Proposed Development.

Decommissioning Phase

4.5.39. The Proposed Development will be decommissioned at the end of its approved operational phase. Decommissioning is expected to take up to 12 months and could be undertaken in phases.

4.5.40. The effects of decommissioning are often similar to, or to a lesser magnitude, than the construction effects. The assessment undertaken for the decommissioning phase as part of the ES is based on assumptions as to how decommissioning would take place, and these assumptions are likely to change over time as practices for decommissioning evolve.

4.5.41. All above ground plant, machinery and equipment will be removed together with all perimeters fencing and any concrete hard standing. This includes but is not limited to all solar infrastructure (solar PV panels, mounting frames and supporting equipment) and cabling less than 1m below ground. Cabling buried more than 1m below ground is proposed to be left in situ.

4.5.42. The exception is the proposed onsite 132Kv substation (and ancillary security measures around the substation compound e.g., perimeter fencing, lighting, and CCTV equipment) and associated access to the Substation will be retained on a permanent basis as this would remain as part of the essential National Grid distribution network infrastructure.

4.5.43. It is the intention that after the 40 years of operation, the Site will be available to revert to its current use and be used by the landowner for agricultural operations of their choice and determined by the global markets at that time. It is the intent that the permissive

paths would also be closed to the public once the Proposed Development is decommissioned. Any requirements to leave certain infrastructure, for example internal access tracks, would be discussed and agreed with landowners as part of the decommissioning process. It is assumed established habitats such as any tree and hedgerow planting, would be retained when handed back to landowners, who would then have the ability to do as they wish (within the restrictions of the planning system) with their land. Following decommissioning, there may be a period of soil management aftercare.

4.5.44. Decommissioned items would be recycled or disposed of in accordance with good practice and market conditions at the time of decommissioning. As the majority of the equipment is classed as electrical it will fall under WEEE Regulations, designed to reduce the amount of waste electrical and electronic equipment incinerated or sent to landfill sites. Reduction is achieved through various measures which encourage the recovery, reuse and recycling of products and components.

4.5.45. Solar PV panels typically consist of glass, silicon, aluminum and a small percentage of copper, tin, and lead. The glass and metals are readily recycled. Recycling of silicon is an emerging market but there are already specialist companies who offer this service. All other components of the Proposed Development are generally recyclable and general recycling rates for electrical equipment are in excess of 90%.

4.5.46. Prior to the commencement of decommissioning, a decommissioning plan will be prepared and the Site will be surveyed to identify ecological constraints. The decommissioning of the Proposed Development would be controlled by planning condition.

4.6. Alternatives

4.6.1. Regulation 17 (3)(d) of the EIA Regulations requires that the ES contain:

'a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment'.

4.6.2. Additionally, paragraph 2 of Schedule 4 of the EIA Regulations requires that the ES contain:

'A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.'

4.6.3. This section of the ES therefore identifies the main alternatives to the Proposed Development which have been considered by the Applicant.

4.6.4. The main alternatives to the Proposed Development include:

- The 'No Development' Alternative;
- Alternative Locations;
- Alternative Designs; and
- Alternative Technologies

The 'No Development' Alternative

4.6.5. The 'No Development' Alternative refers to the option of leaving the Application Site in its current use and physical state, as set out in **ES Chapter 3 – The Application Site.**

4.6.6. Without development, it is anticipated that the Site would continue to be primarily in agricultural use. The agricultural processes on the Site may change over the next 40 years, depending on a number of factors, including the global market for products and chemical costs. As such, the significant impacts both adverse and beneficial that are highlighted in this ES would not occur.

4.6.7. The 'No Development' alternative would result in the loss of opportunity for providing much needed renewable energy generation within the UK. Under current legislation and policy, the Government has committed to fully decarbonising the power system by 2035, underpinning its 2050 net zero contributions. In the British Energy Security Strategy[1] there is the target of increasing the quantity of solar generation within the UK to 70GW by 2035. As of April 2026[2], the UK has an installed capacity of 22.3GW of solar operating within the UK, a three-fold increase would be required to meet the 2035 target.

4.6.8. The Proposed Development will have an export capacity of approximately 46MW. Should the Proposed Development not be taken forward, its energy-generating potential and potential carbon savings would not be recognised. The 'do nothing' alternative would result in the loss of the generation of this renewable energy. To achieve the UK Government solar targets will be challenging and so all opportunities and possible locations for solar farms need to be considered.

4.6.9. No further assessment has been undertaken for the 'no development' scenario because this option is not considered a reasonable alternative to the Proposed Development as it would not deliver the additional electricity generation proposed.

Alternative Locations

[1] Department for Energy Security & Net Zero (April 2022) Policy paper British energy security strategy
[2] Department for Energy Security & Net Zero (May 2026) Solar photovoltaics deployment

4.6.10. The Proposed Development must be located near to an existing grid connection to ensure that a viable development capable of generating renewable electricity that can be exported to the grid can be realised. The Applicant has an agreement which allows for the connection of a solar farm to a direct wire point of connection to the Dŵr Cymru Court Farm Water Treatment Works and the remainder of the renewable energy will be exported to other sites across the Dŵr Cymru Welsh Water portfolio via the National Grid connection to the existing 132kV overhead line at Dŵr Cymru Welsh Water Court Farm Treatment Works. This agreement secures the capacity available on the grid for a fixed period of years for this form of generation.

4.6.11. The Site has been considered acceptable for the Proposed Development following the Site Selection Assessment submitted with the wider DNS planning application documentation, upon when the Applicant undertook a rigorous assessment of land available in close proximity to the point of connection that balanced both environmental constraints and the ability to deliver a large-scale solar farm, consistent with the opportunity provided by the existing point of connection and agreement. The process involved a review of land availability and suitability in the area surrounding the point of connection, a selection and assembly of land and refinement of land to produce the Site. It is clear from national policy that renewable energy including solar is urgently required and therefore an alternative use for the Site is not supported.

4.6.12. In order to focus the site selection process, an initial appropriate search area had to be defined. The Applicant identified optimal locations for solar farms of a nationally significant scale based on two key factors: the irradiance and yield; and the availability of grid connection capacity.

Irradiance and yield

4.6.13. Solar irradiance refers to the amount of energy from the sun that reaches the surface of the earth and is measured by the amount of sunlight received per square metre per second (Wh/m2). The amount of solar irradiance impacts on the potential yield of solar farm, affecting the amount of sunlight falling on the PV modules to be converted to energy. The irradiance and subsequent yield of an area is influenced by factors such as its location, climate/weather patterns, altitude and topography. Whilst there are clearly significant differences in such factors globally, there are also national variations leading to some areas of the UK being more suited to solar energy than others.

4.6.14. Wales, particularly west and south Wales have irradiation levels that are conducive for large scale investment in solar farms, and as such form an integral part of the Applicant's investment programme. The region also has a significant amount of pre-existing transmission infrastructure, which would reduce the likelihood that any new overhead infrastructure would be required to connect the generator to the transmission system.

Grid Connection Capacity

4.6.15. One of the biggest constraints to be considered when developing a renewable energy scheme is securing a viable point of connection to the electricity network. Grid connection is of key importance to solar farm as the cost of grid connection can make potentially suitable sites, given environmental issues and irradiance levels, unviable. Additionally, in order to minimise potential environmental impacts associated with cable routes, and to minimise the potential for any transmission losses that may occur along longer lengths of cabling, it is preferable to locate a renewable energy development as close as reasonably practicable to the point of connection.

4.6.16. Following correspondence with National Grid, the Applicant was notified of grid capacity at 46MWac for 2031. The point of connection therefore formed the centre point of the 'Area of Search' which was used when identifying a suitable site. However, it is also important that when selecting a site, due consideration is given to minimising potential environmental effects that may arise from locating the development in that location.

4.6.17. It was therefore deemed appropriate that the Area of Search around the point of connection should be at 10km, to ensure that every opportunity had been given to finding a site that was both technically feasible and minimised potential environmental effects. Beyond 10km, it was considered that the technical restrictions and associated environment effects of providing cable routing to the point of connection would outweigh any potential benefits that a potential site may have.

Policy

4.6.18. Having established the potential for the Proposed Development to connect at the point of connection, it was then necessary to determine if this was a potentially acceptable location in terms of planning policy. The Welsh Government does not place a quantitative cap on renewable energy development. Instead, it establishes a strong presumption in favour of renewable energy schemes where environmental and amenity impacts are acceptable or can be appropriately mitigated.

4.6.19. Unlike the National Planning Policy Framework (NPPF) in England, Welsh policy does not prescribe a formal sequential test for solar energy development outside of flooding considerations under TAN 15[3]. However, Planning Policy Wales[4] (PPW) establishes a clear national commitment to renewable energy generation and decarbonisation, requiring planning authorities to facilitate renewable energy development in appropriate locations.

4.6.20. The national development framework for Wales, Future Wales: The National Plan 2040[5] does not provide pre-assessed areas for solar developments, as it does for wind, and is

[3] Welsh Government (March 2026) Technical advice note (TAN) 15: development, flooding and coastal erosion
[4] Welsh Government (February 2024)Planning Policy Wales – Edition 12 (February 2024)
[5] Welsh Government (February 2021) Future Wales: The National Plan 2040

clear that large-scale solar developments will not be permitted in National Parks or Areas of Outstanding Natural Beauty. Outside of these areas a positive policy framework exists.

4.6.21. Future Wales: The National Plan 2040 states that there is strong potential in the Southeast Wales for solar energy generation and Strategic and Local Development Plans should provide a framework for generation and associated infrastructure.

4.6.22. No Strategic Development Plan has been adopted for Southeast Wales. The plan is being developed by the Cardiff Capital Region Consortium (CJC) in collaboration with local authorities and is expected to be adopted around 2031.

4.6.23. The Site extends across the administrative area of Monmouthshire County Council (MCC), Torfaen County Borough (TCB) Council and Newport City Council (NCC). The Adopted Local Plans[6] and material considerations in the form of current Supplementary Planning Guidance do not provide any spatial guidance on the location of solar farm developments.

4.6.24. MCC sets out in Policy SD1- Renewable Energy of the Monmouthshire County Council Adopted Local Development Plan (February 2014) that schemes will be permitted where:

"(1) There are no unacceptable adverse impacts upon the landscape, townscape and historic features and there is compliance with Policy LC5, with regard to protection and enhancement of landscape character;

(2) There are no unacceptable adverse impacts on biodiversity;

(3) There are no unacceptable adverse impacts on the amenities of nearby residents by way of noise, dust, odour or increases in traffic;

(4) The wider environmental, economic, social and community benefits directly related to the scheme outweigh any potentially adverse impacts; and

(5) The distinct identity of Monmouthshire will not be compromised"

4.6.25. NCC sets out in the Newport 2011 -26 Local Development Plan (January 2015) – *"With regards to solar energy, key considerations in their assessment will include the ecological, landscape and visual impact of a scheme. The potential for reflective 'glint and glare' will need to be explored as well as potential ecological and visual impacts from installation techniques such as cable trenches and the removal of hedgerows. Similarly the impact of associated infrastructure and security measures will need to be considered…. Development of larger scale renewable*

[6] Monmouthshire County Council Adopted Local Development Plan (February 2014), Torfaen County Borough Council Local Development Plan (to 2021) Adopted December 2013, Newport 2011 -26 Local Development Plan (January 2015)

energy schemes may be acceptable on greenfield sites where it can be demonstrated that there will be no significant adverse impacts on the environment and local communities".

4.6.26. MCC produced 'Monmouthshire Renewable Energy and Energy Efficiency SPG (March 2016)' providing guidance to developers seeking to make planning applications for renewable energy. This SPG is not a statutory Local Development Plan document. The report should be used assist what type of renewable and low carbon technologies to use in a given application, need for other consents and how to make an application. The document does not directly assist in identified locations for solar development.

4.6.27. It should be noted that MCC produced an evidence paper 'Renewable and Low Carbon Energy Background Paper October 2024[7]' for the 'Monmouthshire Replacement Local Development Plan 2018-2033'. The RLDP was submitted to PEDW in November 2025 and examination is expected to start in June 2026, however, this is therefore not yet adopted. It is indicated in this document that areas of the Application Site are considered less constrained and land suitable for solar (see Figure 6 – Refined Potential Local Search Area – Area 10 (subject to ongoing refinement)). This took into account to identify sites, potential MW capacity, local landscape value, cumulative impacts, grid constraints and agricultural land classifications. Area 10 was noted a priority area as limited constraints and ranked 1st in priority (see paragraph 2.10 of the document).

Consideration of Environmental Constraints

4.6.28. A search area for potential development sites involved a consideration of potential environmental constraints within the 10km Area of Search. A constraints mapping exercise was undertaken in order to assess potential locations for siting the Proposed Development within the Area of Search. This was undertaken using Geographic Information Systems (GIS) software. A summary of the factors considered, and criteria is set out below:

- 10km search area from the POC;
- Slopes between 0-15 degrees;
- Statutory & Non-Statutory Environmental designations, including - Special Protection Areas, Special Areas of Conservation, Sites of Special Scientific Interest, RAMSAR sites, National Nature Reserves, Local Nature Reserves, Ancient Woodand, RSPB Reserves, Woodland/Forests, Scheduled monuments, Listed Buildings, Registered Historic Park & Gardens, Country Parks, Conservation Areas, Open Access Land and Special Landscape Areas.

[7] Renewable and Low Carbon Energy Background Paper October 2024 - https://www.monmouthshire.gov.uk/app/uploads/2025/10/SD149-Renewable-Energy-Background-Paper-October-2024.pdf

- Allocated Sites;
- Agricultural Land (Best and Most Versatile);
- Flood Risk;
- Existing infrastructure constraints with 5m buffers from roads and railways and 10m buffers from buildings; and
- Similar land area size (100 ha+).

4.6.29. It was recognised that across the Area of Search there were already various other renewable energy projects at various stages of development. These were mapped and their locations discounted in the site selection process, along with other areas of existing built development.

4.6.30. Additionally, areas of land previously developed land were considered. Unlike England, there is no statutory brownfield land register in Wales. Information on previously developed land is not held within a single, standardised national dataset and is instead derived from local authority evidence bases, planning policy documents and site-specific records. No identified previously developed land within in the Area of Search has been identified.

4.6.31. Commercial roof spaces are not viable for a large-scale soar development. It is established that generally 1 MW of solar would need to occupy a land space of 2.5 ha. Areas of 2.5 ha or less are below the threshold of a large- scale solar development and therefore sits outside of the scope of the assessed criteria. Additionally, many domestic and industrial buildings either do not have roofs made of suitable material to support a solar PV system, do not have the infrastructure to export electricity to the gird, or simply present as an unaffordable solution, with initial costs of installation unviable. As a result, large scale ground mounted solar is often required on greenfield land in a necessity to deliver the quantum of solar power needed. Therefore, it has been necessary to identify greenfield site that would be acceptable in land use planning and environmental terms.

4.6.32. It was important to ensure that any potential site comprised a suitable shape, orientation and size that could appropriately accommodate the Proposed Development. Large open fields reduce the impact that smaller fields can have on the layout design as typically, buffers are left around field edges to offset from vegetation, tree root protection zones and other constraints such as ditches. So significantly less capacity can be sited within a group of smaller fields compared to fewer larger fields. A site size of 100 ha approximately was deemed appropriate as a significantly smaller site would not accommodate the scheme efficiently or viably on a cost per megawatt basis. Where appropriate, parcels may be combined provided they are contiguous or functionally connected.

4.6.33. A series of plans are presented at **Figure 4.3 – Site Selection Assessment Plans** detailing the constraints applied such as study area, slope, infrastructure constraints,

environmental designations, agricultural land classification, flood zones and unconstrained area land sizes.

4.6.34. Three sites were identified in this process with potential as alternative site locations. These three sites are labelled as follows, identified in **Figure 4.3 – Site Selection Assessment Plans (Possible Sites- Distance to Connection)**;

- Possible Sites – Area 1
- Possible Sites – Area 2
- Possible Sites – Area 3

Suitability of Alternative Sites Identified

Possible Sites – Area 1

4.6.35. Possible Site Area 1 has a potential developable area of approximately 174.6ha of greenfield/ agricultural land, within multiple land parcels in close proximity to each other and therefore large enough for the proposed scale of the Proposed Development.

4.6.36. Possible Site Area 1 is located where a number of PRoW's bisect through Possible Site Area 1 and surround the possible site. In addition, a number of water features are located within and surrounding Possible Site Area 1. Llandegfedd Reservoir SSSI is adjacent to the northern parcel of land. A Special Landscape Area is immediately to the west of Possible Site Area 1. An area designated for green space is immediately adjacent to the most northern parcel of land.

4.6.37. The nearest overhead 132kv power lines to connect into is at closest approximately c.500m from Possible Site Area 1. In comparison, the Application Site benefits from a point of connection direct significantly reduces the need for extensive off-site cabling works, minimises environmental effects, and materially improves project viability. Connection costs increase substantially with distance and voltage requirements; therefore, sites without feasible and cost-effective connection opportunities were discounted at an early stage.

4.6.38. Due to surrounding environmental constraints and grid connection proximity, Possible Site Area 1 is not sequentially preferable for a solar farm development than the Application Site.

Possible Sites – Area 2

4.6.39. Possible Site Area 2 has a potential developable area of approximately 447.7 ha of greenfield/ agricultural land, within multiple land parcels in close proximity to each other and therefore large enough for the proposed scale of the Proposed Development.

4.6.40. Possible Site Area 2 is identified in part of one of the western land parcels for a Potential Waste Management Sites under Policy SAW1 of the MCC Adopted Plan. Large areas

identified as a Minerals Safeguarding Area (Policy M2 of MCC Adopted Plan) are located at closest c.50m west from Possible Site Area 2. South of Possible Site Area 2 c.500m is a Safeguarding of Mineral Resource Area (Policy M1 of MCC Adopted Plan). A number of PRoW's bisect through Possible Site Area 2 and surround the possible site. In addition, a number of water features are located within and surrounding Possible Site Area 2. A Registered Historic Parks and Gardens is located immediately south of the southern parcels of land for Possible Site Area 2.

4.6.41. The nearest overhead 132kv power lines to connect into is at closest approximately 5.6km from Possible Site Area 2. In comparison, the Application Site benefits from a point of connection direct significantly reduces the need for extensive off-site cabling works, minimises environmental effects, and materially improves project viability. Connection costs increase substantially with distance and voltage requirements; therefore, sites without feasible and cost-effective connection opportunities were discounted at an early stage.

4.6.42. Due to surrounding environmental constraints and grid connection proximity, Possible Site Area 2, is not sequentially preferable for a solar farm development than the Application Site.

Possible Sites – Area 3

4.6.43. Possible Site Area 3 has a potential developable area of approximately 174.6 ha of greenfield/ agricultural land, within multiple land parcels in close proximity to each other and therefore large enough for the proposed scale of the Proposed Development.

4.6.44. Possible Site Area 3 is identified across some of the western land parcels as allocated for Sand & Gravel Resource, a draft allocation area from the Newport Local Development Plan Preferred Strategy (October 2023) and an existing planning application. In addition, a Site of Nature Conservation Importance (SNCI) is identified within parts of the Possible Site Area 3 and adjacent as part of the Newport Replacement Local Development Plan. An area designated as an Archaeologically Sensitive Area associated with the former Tata Steel Plant in the Newport Replacement Local Development Plan is located within the southern section of some southern land parcels in Possible Site Area 3, and adjacent to the south. Some of the eastern land parcels in Possible Site Area 3 are allocated for the Safeguarding of Mineral Resource (Policy M1 of MCC Adopted Plan). A number of PRoW's bisect through Possible Site Area 3 and surround the possible site. A Registered Historic Parks and Gardens is located adjacent to one of the northern parcels of land. A number of SSSI's are either adjacent or within the immediate locality of the Possible Site Area 2. Lastly, a number of water features are located within and surrounding Possible Site Area 3.

4.6.45. Due to the congested amount of environmental constraints within and surrounding Possible Site Area 3 it is not sequentially preferable for a solar farm development than the Application Site.

<u>Alternative Location Conclusion</u>

4.6.46. The point of connection for the Proposed Development connects directly to existing onsite overhead line infrastructure and is a critical factor in the site's suitability and deliverability. This materially reduces the requirement for off-site connection works and limits associated environmental and third-party land impacts. Grid analysis undertaken by the Applicant identified the presence of a viable overhead line point of connection at Dŵr Cymru Welsh Water Court Farm Treatment Works with a partnership with Welsh Water and the Applicant created. Renewable energy from the Site via a direct private wire connection is intended to be supply 100% clean and stable energy directly to the grid for Dŵr Cymru Welsh Water wider estate, helping to meet Government and company targets for carbon neutrality and enabling Welsh Water to reduce reliance upon the National Grid and provide protection from fluctuating energy prices. The proposal will assist with mitigating customer bills at a time of high inflation.

4.6.47. Land therefore in close proximity to the established point of connection was a priority and engagement was undertaken with landowners within close proximity to the viable grid connection infrastructure to identify potentially suitable and available sites of sufficient scale (approximately 100 hectares or more). Interested landowners willing to facilitate the Proposed Development with land available now are incorporated into the scheme – this is an important delivery factor when considering the project feasibility.

4.6.48. Commercial viability, including anticipated grid connection costs and landowner terms is an important factor. Rental expectations vary considerably and form part of the overall deliverability assessment.

4.6.49. This process confirmed that what has now become the Application Site and has willing landowners land parcels in close proximity and met the suitability criteria set out above, including:

- Sufficient land area to accommodate a 46MW AC scheme;
- Direct access to onsite overhead line infrastructure;
- Be in a suitable location for solar development and the ability to avoid or mitigate key environmental constraints; and
- A reasonable prospect of deliverability, availability and economic viability.

4.6.50. Accordingly, the Proposed Development was progressed for detailed environmental assessment and scheme design.

4.6.51. The result of the Site Selection Assessment process is that the Site is considered suitable for the Proposed Development and would be, sequentially, the most acceptable within a 10 km radius of the point of connection. It is therefore considered that the Site represents the most appropriate location to take advantage of the availably capacity point of connection. The Site's scale, grid connection opportunity via the existing onsite overhead

line, relative lack of environmental constraints, and landowner agreement distinguish it from other land that could potentially have been progressed.

Alternative Designs

4.6.52. Initial concept designs were prepared and refined as the Site boundary and the Proposed Development was progressed in its formulative stages up to the 'design freeze' for this draft Environmental Statement for Statutory Consultation.

4.6.53. The Proposed Development has undergone an iterative design process, evolving from an initial indicative layout (October 2025) to a refined scheme presented at Statutory Consultation. The early layout established the broad development parameters, including the overall extent of the site, indicative panel arrangement, and high-level infrastructure principles. However, it remained flexible, with infrastructure such as the substation, construction compounds, and access provision shown on an indicative basis only.

4.6.54. Through ongoing environmental assessment, technical design and consultation, the layout has been progressively refined to form a deliverable and coordinated scheme. The current layout includes defined infrastructure components, including a fixed substation location, main site compound, inverter and transformer stations, and a clearly defined internal cable route. The substation location has been refined after ongoing engagement with National Grid relocated to new land west of Dŵr Cymru Welsh Water Court Farm Treatment Works

4.6.55. Access and construction arrangements have also been significantly developed, with the inclusion of a defined network of site access tracks, passing places, and updated gate locations. In addition, new area of land (Land Parcel 14) has been included to provide an indicative haul road for construction traffic and deliveries after engagement with highways officers at MCC, TBDC and NCC and advice on the construction routing strategy.

4.6.56. The solar array layout has been subject to iterative adjustment throughout the design process, including refinement of panel spacing, relocation of panels, and removal of panels in certain areas. These changes reflect environmental and technical considerations identified during the design process, including responses to site constraints and the optimisation of the scheme layout.

4.6.57. The planning application boundary has also been refined to provide greater clarity, including the identification of land not forming part of the application. In addition, new areas of land (Land Parcel 15) has been incorporated into the scheme to provide further ecological enhancement opportunities – no development is proposed in this Land Parcel. This ensures a clear distinction between the extent of the Proposed Development and adjoining land, supporting robust environmental assessment and definition of the development envelope.

4.6.58. The above therefore illustrates an iterative approach to design, which has been incorporated into the Proposed Development as 'embedded mitigation' or 'mitigation by design'.

4.6.59. The Proposed Development conforms to the Development Parameters that have been subject to environmental impact assessment as reported in the ES.

4.6.60. Notwithstanding this, the layout has been presented at the Statutory Consultation stage and remains subject to further refinement in response to consultation feedback and ongoing detailed design. Any such changes will be reviewed to ensure that they do not give rise to new or materially different likely significant environmental effects, or that these are appropriately assessed where required.

Alternative Technologies

4.6.61. With respect to the technology installed at solar farms, the consideration of alternatives generally relates to two operational solutions:

i. Types of solar PV panels, and

ii. Types of inverters.

4.6.62. The Applicant has considered these technology solutions in relation to the Proposed Development.

Types of solar PV panels

4.6.63. There are two principal types of solar PV panels available for deployment within the UK:

i. Fixed

ii. Tracking

4.6.64. Fixed solar PV panels are mounted on frames, fixed to a single height and axis, i.e., they are generally fixed to face due south.

4.6.65. Tracking solar PV panels are mounted frames which are motorised and automated to track the sun across the sky. In this way they can turn to face the sun as it rises in the east, and track it through to sunset in the west, which allows them to maximise generation across the full extent of the day and deliver better yields.

4.6.66. The key differences between fixed and tracking solar PV panels are that:

- Fixed solar PV panels are substantially cheaper to deploy and a more reliable technology.
- Fixed solar PV panels require less maintenance, and as such less traffic is likely to be generated in the operational phase.
- Tracking solar PV panels require a motor and so generate some noise, fixed solar PV panels do not;

- Fixed solar PV panels generate less electricity per panel across the day, and as such produce a reduced yield and return for developers.
- Fixed solar PV panels can have a reduced glint and glare impact compared to solar tracking solar PV panels.

4.6.67. Considering the factors set out above, the Applicant has chosen to deploy fixed solar PV panels with the Proposed Development.

Types of Inverters

4.6.68. Inverters receive direct current (DC) from the solar PV panels and convert it into alternating current (AC). This enables the electricity generated to be transferred directly to the National Grid distribution network infrastructure.

4.6.69. Inverters principally come in two different forms, which can be used on commercial solar farms. These are referred to as string inverters and centralised inverters.

4.6.70. String inverters are individual inverters that are placed at the end of a row, or rows, of solar PV panels. They are relatively small and easy to mount onto the end of solar PV panels , and each string inverter will control a particular area, in terms or rows, of the solar farm.

4.6.71. A key benefit of string inverters is that as the role of the inverter is decentralised, if one fails then only the panels that it controls within that string would be taken out of generation. Distributing the inverters in this way also helps to distribute any impacts associated with the noise they generate, which was a key consideration for the Proposed Development, as evidenced by the fact that operational noise of the Proposed Development is below ambient levels at noise sensitive receptors.

4.6.72. Centralised inverters are similar to small shipping containers, which house a large number of inverters to which the solar PV panels connect. A much greater number of solar PV panels connect directly to a centralised inverter compared to a string inverter. The benefit of centralised inverters is that they are cheaper to install compared to string inverters.

4.6.73. The key differences between string inverters and centralised inverters are that:

- String inverters can be mounted directly to the solar PV panels and do not require foundations or footing, unlike central inverters.
- By virtue of being mounted on the solar PV panels, string inverters are less visually prominent than centralised inverters.
- String inverters are smaller than centralised inverters and so are less visually intrusive.

- String inverters are more expensive to install than centralised inverters but generally have reduced maintenance costs due to the more straightforward technology deployed.
- String inverters generate lower noise levels and distribute any noise impacts across the Site – centralised inverters produce much greater noise in a single location.
- String inverters generally require less maintenance, and if one fails the wider solar farm can continue to generate electricity.

4.6.74. Considering the factors set out above, the Applicant has chosen to deploy string inverters with the Proposed Development.