

# 5. NEED AND ALTERNATIVES

## 5.1 INTRODUCTION

5.1.1 This chapter sets out the need for the proposed solar farm and presents the site selection and design evolution process including the consideration of alternatives.

5.1.2 Schedule 4 of the EIA Regulations states that an ES should include:

*“A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the applicant or appellant which are relevant to the proposed development and its specific characteristics and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effect”.*

5.1.3 This chapter includes the following sections:

- Need for the development; and
- Alternatives:
  - Consideration of alternative sites and the reasons for selecting the preferred location.
  - Consideration of alternative renewable energy technology, site design and configuration

## 5.2 NEED FOR THE DEVELOPMENT

5.2.1 The importance of renewable energy generation as part of the response to climate change is recognised at both a UK Government level and at a local level. Future Wales confirms ‘in principle’ support for the development of renewable energy at all scales and Paragraph 5.9.15 of Planning Policy Wales Edition 11 confirms that the need for renewable energy generation is not a material planning consideration. It states:

*“...planning applications for renewable and low carbon energy developments should be determined based on the merits of the individual proposal. The local need for a particular scheme is not a material consideration, as energy generation is of national significance and there is a recognised need to optimise renewable and low carbon energy generation”.*

5.2.2 Chapter 4 of this ES has set out the key national and local planning policy that is relevant to the Development.

5.2.3 Both Future Wales and PPW set the following ambitious targets for the generation of renewable energy in Wales:

- For 70% of electricity consumption to be generated from renewable energy by 2030;
- For one gigawatt of renewable energy capacity to be locally owned by 2030
- For new renewable energy projects to have at least an element of local ownership from 2020.

5.2.4 In February 2021, the Welsh Government set out its legal commitment to achieve net zero emissions by 2050<sup>1</sup>. The Energy Generation in Wales 2018 report<sup>2</sup> estimates that 50% of electricity consumption comes from renewable sources leaving a

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<sup>1</sup> <https://gov.wales/wales-commits-net-zero-2050-sets-out-ambitions-get-there-sooner>

<sup>2</sup> Energy Generation in Wales 2018: <https://gov.wales/sites/default/files/publications/2019-10/energy-generation-in-wales-2018.pdf>

significant shortfall if the Government's target is to be met.

- 5.2.5 At the local level, IACC's Joint LDP outlines an objective to promote renewable and low carbon energy production and it is understood that the Council are producing a Climate Change Masterplan having declared a climate emergency in September 2020.
- 5.2.6 It is widely accepted that electricity produced from solar energy has a positive benefit compared to traditional forms of electricity generation in terms of avoiding carbon emissions. Furthermore, renewable energy from solar PV supports the national economic objective to diversify energy supply and to lessen dependence on the generation of fossil fuels. The Welsh Government consequently considers that the wider benefits to society and the economy (of renewable energy) are significant and must be given weight by decision makers in reaching their decisions on individual applications.
- 5.2.7 Parc Solar Traffwll will have an export capacity of circa 35MW of electricity, enough to power approximately 11,600 homes per year and offset over 7,840 tonnes of CO<sub>2</sub> every year, the equivalent of taking around 3,620 cars off the road. In addition, the operation of the scheme would reduce the emissions of the gases sulphur dioxide and nitrogen oxides, which contribute to the production of acid rain.

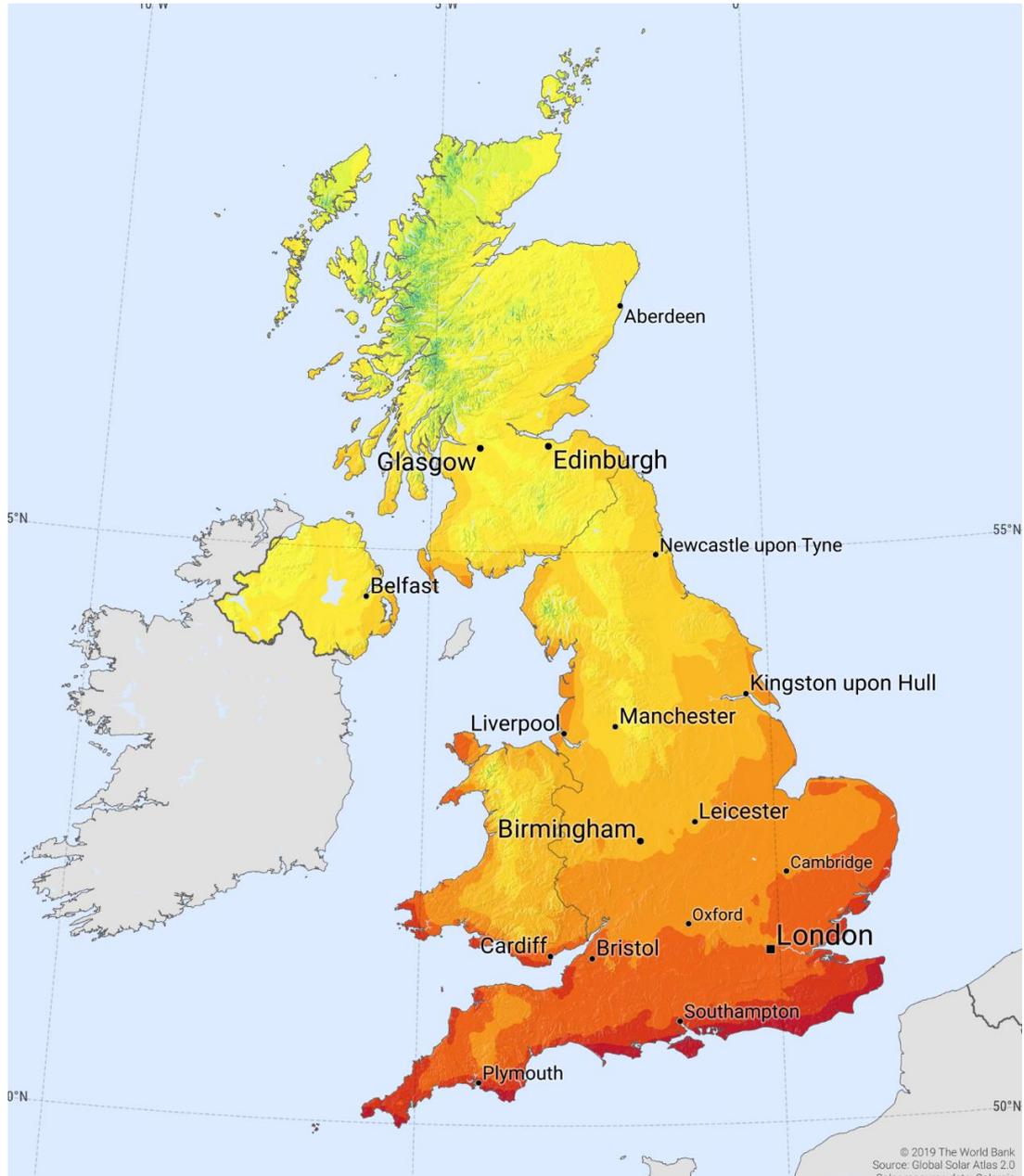
### 5.3 SITE SELECTION

- 5.3.1 The development areas that make up the Application Site were selected through an extensive search criteria exercise undertaken by the Applicant. Anglesey represents a particularly favourable area for solar deployment because of the high levels of solar irradiation through its proximity to the coastline. This can increase power generation over sites of equivalent size located away from the coast. Using the Renewable Energy Capacity Assessment from the Joint LDP as a guide to focus the site search, the Applicant reviewed a number of sites across Anglesey to assess the potential for the development of solar projects.
- 5.3.2 A range of technical, environmental and economic factors are considered when assessing a site for ground-mounted solar PV development. Key factors for consideration include:
- Solar irradiation levels;
  - Availability and proximity of the local distribution network (grid);
  - Proximity to local population;
  - Topography;
  - Field size and shape;
  - Potential for overshadowing;
  - Development Plan Policy;
  - Access to the site for construction/decommissioning traffic;
  - Agricultural land quality;
  - Landscape sensitivity and visual impact amenity;
  - Nature conservation and potential for enhancement;
  - Flood risk; and
  - Land availability.

#### Solar Irradiation Levels

5.3.3 UK irradiation levels are illustrated below in **Figure 5.1**. It shows that the coastal area around the west of Anglesey (where the site is located) receives some of the highest amounts of sunshine within North Wales. This presents a particularly favourable area for solar development as it allows for significantly more electricity generation than other site locations.

Figure 5.1: UK Irradiance Levels



#### Availability and Proximity to Distribution Network

5.3.4 An important aspect of solar farm development is having access to the local distribution network, or 'grid'. To export electricity generated by a solar farm there must be sufficient capacity on the network to accommodate the additional power from

the development.

- 5.3.5 **Figure 5.2** below is the Scottish Power Energy Network (SPEN) Heatmap from May 2021 which illustrates the local grid network and where there is available capacity to export energy back into the grid. The substations and circuits highlighted in red have at least one factor close to their operational limit and therefore installation of most levels of distributed generation and a local connection is highly unlikely and may require extensive reinforcement works. The substations and circuits highlighted in orange have at least one factor nearing its operational limit and depending on these factors and detailed studies capacity may be available subject to potential network reinforcement works. The substations and circuits highlighted in green have all operational factors within tolerable limits. As can be seen from the map, the area of search is therefore severely restricted due to the lack of grid capacity.

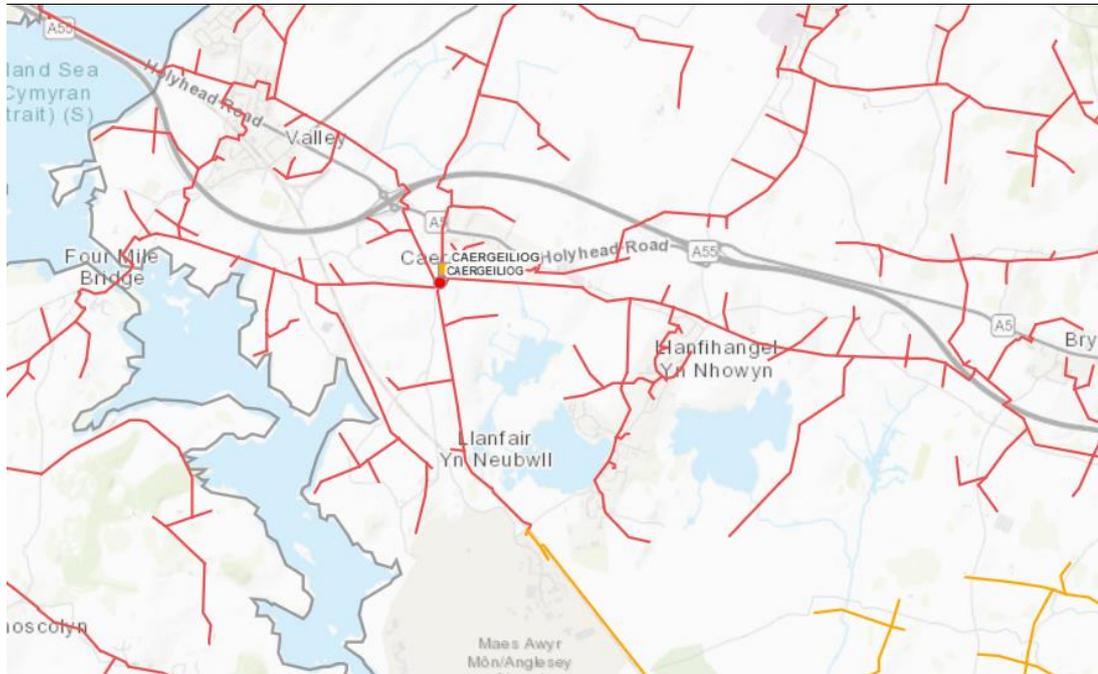
Figure 5.2: Scottish Power Energy Network Heatmap, May 2021



- 5.3.6 There are two supergrid substations where operational factors are in tolerable limits (green). The proposed development was able to secure the remaining viable capacity at the substation at Caergeiliog. The remaining network is at capacity without significant upgrades.
- 5.3.7 Caergeiliog substation is currently the only feasible option for connecting to the distribution network on Anglesey. Connecting to the supergrid substations or the National Grid transmission network would be a significant financial undertaking and one that a solar scheme of this scale could not accommodate. Connecting direct onto the 132kV line between Caergeiliog and Amlwch would require larger connecting infrastructure in the form of a 33kV to 132kV substation compound. Connecting directly into the existing 33kV substation, in this instance, avoids having to build unnecessary infrastructure or the DNO having to reinforce the network. **Figure 5.3**

shows the 11kV distribution network surrounding Caergeiliog substation which is at operational limits. Notwithstanding existing limited capacity on the medium voltage network, exporting power from the solar farm onto this line would not be suitable as they typically struggle to accept more than 5MW.

Figure 5.3: 11kV Distribution Network Surrounding Caergeiliog Substation, May 2021



- 5.3.8 Proximity to an available grid connection is critical to the viability of any renewable energy project, particularly solar PV. The industry-standard approach is to secure sites within 3.5km of a grid connection. This is partly due to the excessive costs of the cable and the trenching works, partly due to the requirement for easements to enable the crossing of third-party land, and necessary roadworks which may disrupt local communities. Additionally, long cables introduce voltage drops and unwanted energy losses which cause further difficulties for the distribution network operators.

#### Proximity to Local Population

- 5.3.9 For any development, minimising potential impacts to residential amenity is a key aspect. Therefore, distance from centres of population is a key locational factor for proposed solar farms. In some cases, it is not possible to be distant from the curtilage of every residential property however it is an important element of the site selection process to minimise impacts on local residences.
- 5.3.10 The low height of the solar panels (up to 3m above ground level), the proposed screening, landscaping and the generally flat nature of the topography means that longer distance views from nearby villages are limited for the proposed development site. This has been confirmed in the Landscape and Visual Impact Assessment (LVIA) as reported in Chapter 7 and **Appendix 7.5** of this ES. Where there are residential properties adjacent to the development areas, a buffer zone (and

additional hedgerow planting where appropriate) has been applied to set back the panels from the curtilage of properties so as avoid negatively impacting the enjoyment of these areas.

- 5.3.11 The development areas were selected due to their relative distances from nearby villages of Llanfihangel yn Nhowyn (over 100m from DA6 at its closest point), Bryngwran (approximately 480m from DA4) and Caergeiliog (approximately 275m from DA6). Furthermore, the proposed site arrangements (**drawings LOC1001/01/04 and 05**) show buffer areas from adjacent residential properties.

#### Topography

- 5.3.12 Flat or gently undulating land is preferred for solar development as construction is more straightforward, shading between arrays is limited and more consistent and flat land is generally less visible than slopes where the surrounding topography is also flat or has gentle gradients. The design of the development will however respond to the terrain and physical features
- 5.3.13 The vast majority of the Application Site is flat, with little or no gradient, and so it is well suited to the proposed development.

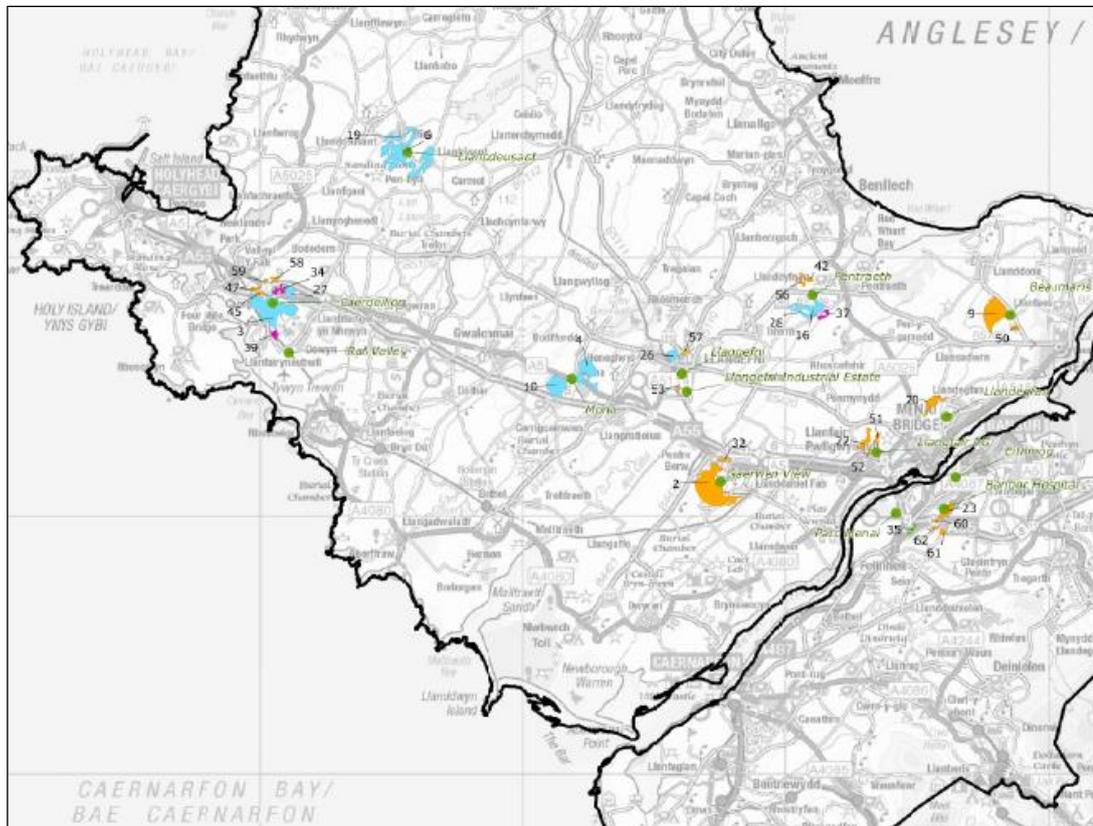
#### Field Size

- 5.3.14 In the efficient deployment of solar large, open fields are preferable. However, smaller fields with established field boundaries will help to visually contain a solar proposal and be more sympathetic to local landscape character. Therefore, a balanced approach to field size and boundary treatment is needed.
- 5.3.15 The application site includes a range of field sizes with larger ones included in DA4 and 5 and well contained fields in DA6.

#### Site Specific Allocation

- 5.3.16 The JLDP identifies areas of search for solar which is based on an Assessment of the Potential for Solar PV Farms in Gwynedd and Ynys Môn (2016). Using this assessment as a guide, Low Carbon undertook a review of sites across Anglesey to consider the potential for the development of a solar project. It should be noted that since the assessment was published in 2016, grid capacity constraints have changed and therefore the Applicant has also undertaken their own network capacity review, see 5.3.4 - 5.3.8 above.

Figure 5.4: Search Areas for Solar (Assessment of Potential for Solar PV Farms in Gwynedd and Ynys Môn (2016)



- 5.3.17 **Figure 5.4** above illustrates the search areas for solar on Anglesey. The highlighted blue areas are opportunity areas over 12ha considered to be of lower sensitivity. The orange areas are opportunity areas either less than 6ha or with higher sensitivity. As can be seen, the area around Caergeiliog is highlighted blue and shown as an allocated search area for solar development.
- 5.3.18 On review of the light blue opportunity area around Caergeiliog it was found that a significant proportion of this area was constrained by rocky outcrops which would make deployment very difficult and the project not viable. Land to the immediate north-east, east and south-east of the substation was vegetated with scrub and trees. Approaches were made to landowners within the solar search area but none were interested in having solar on their land.
- 5.3.19 The application site is considered to be the closest available to identified solar search areas.

#### Access to Site for Construction

- 5.3.20 Appropriate access to the solar development areas must be available for the construction and decommissioning phases. The A55 runs east to west to the north of the development areas from which there are two junctions that serve the site. From these junctions Minffordd Road (to the east) and the A4080 (to west) provide vehicular access to the sites via a series of roads and lanes. These roads and lanes serve local homes, farms and businesses.

- 5.3.21 All indicative development areas have vehicular access in the form of field gates from the public highway.
- 5.3.22 A Construction Traffic Management Statement (CTMS) accompanies the Transport Statement and sets out the proposed access arrangements to each of the development areas; vehicle routing from the A55(T); the anticipated construction programme, construction vehicle numbers; construction worker numbers and the proposed construction hours.

#### Agricultural Land Classification

- 5.3.23 National level guidance on the deployment of ground mounted solar expresses a preference to avoid 'Best and Most Versatile Agricultural Land'. Grades 1, 2 and 3A of the Agricultural Land Classification are considered to be best and most versatile land, whilst 3B, 4 and 5 are not.
- 5.3.24 The soil survey presented in **Appendix 5.1** of this ES has determined there are elements of 'Best and Most Versatile' agricultural land within the development areas. However, on sites with varying grades of agricultural land, the land can only be farmed to the lowest grade within the field. The historic agricultural practices within the development areas reflect this, hence the land has always been grazed or used for haymaking.
- 5.3.25 Furthermore, the solar farm will operate along-side grazing as part of the management of the grass sward. In addition, the construction and decommissioning of the solar farm will have little impact on the land quality as the fields will be returned to full agricultural use on removal of the solar farm and associated infrastructure.

#### Landscape Designations

- 5.3.26 Consideration of national and local landscape designations such as Areas of Outstanding Natural Beauty, National Parks and Special Landscape Areas was undertaken when assessing the potential solar sites.
- 5.3.27 The development areas are not subject to any national or local level landscape designations. The Anglesey AONB is located approximately 1km to the south-west of DA6, the closest of the development areas to the AONB. Effects upon landscape character and views from the AONB have been assessed by landscape and visual impact assessment presented in Chapter 7 of the ES.

#### Nature Conservation Designations

- 5.3.28 Consideration of national and international ecological designations such as Sites of Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites was undertaken when assessing the site's potential for a solar proposal.
- 5.3.29 Biodiversity enhancement schemes are an integral part of solar proposals as the land is effectively managed for 40 years for the benefit for ecology. As part of the proposals for Parc Solar Traffwll, ecological management is a core element. Not only are the development areas managed for species rich grassland, areas within the site not subject to solar PV development will also be managed to secure ecological benefits. For example, Llynau Y Fali Valley Lakes SSSI and Llyn Dinam SPA are

located partially within DA6. It is not the intention to deploy PV in these designated areas, but rather provide a scheme of ecological management to secure enhancements. ES Chapter 11 outlines a land management option for the part of DA6 which will remain free of development. This also justifies the approach to the proposed management and how such options will be implemented.

- 5.3.30 The RSPB also manages the Valley Wetlands Nature Reserve which is centred on Llyn Traffwll. Following extensive bird surveys and discussions with the RAPB and NRW, it was decided to remove DAs 1, 8 and 9 from the proposed development due to their close proximity to the Nature Reserve. Effects on designated ecological sites and mitigation measures proposed are addressed in Chapter 11.

#### Flood Risk

- 5.3.31 Pre-application dialogue with IACC confirmed that the development would fall in the 'less vulnerable' category as defined by TAN15: Development and Flood Risk.
- 5.3.32 The majority of the application site is located within Flood Zone A and therefore considered to be at little or no risk of fluvial or tidal / coastal flooding. A proportion of DA4 and DA5 are located within Flood Zone C2 and therefore a justification test is required to demonstrate the suitability of the proposal together with a Flood consequences assessment (FCA). The FCA is included in **Appendix 8.1** to this ES and the justification test is presented in the Planning Statement submitted in support of the application. The submitted statements demonstrate that the justification test has been met and the identified risks are acceptable.

#### Commercial Agreement with the Landowner

- 5.3.33 Having established the area's potential to accommodate the development it was then necessary to investigate whether sufficient land would be available to allow the development to proceed. To this effect, discussions were held with local landowners to determine interest.
- 5.3.34 The proposed development presents an attractive proposition to the landowners due to the comparative uplift in returns that could be achieved from the land. Commercial terms have been agreed with the landowners for the construction and operation of a solar farm subject to the necessary consents. This established the fundamental deliverability of the development on these sites.

## 5.4 CONSIDERATION OF ALTERNATIVES

### Do Nothing Scenario

- 5.4.1 Should the proposal not be implemented it is likely the site would continue to be used as grazing land. As a result, the following benefits of the proposed scheme would not be realised:
- Powering approximately 11,600 homes per year from a renewable source of energy offsetting approximately 7,840 tonnes of CO<sub>2</sub> each year for the life of the development;
  - Potential for community ownership of part or all of the scheme should this be welcomed;
  - The labour force employed throughout the initial four-month construction stage

could generate between £2.3m and £2.6m in GVA and annual business rates of approximately £115,000 the local authority; and

- Significant enhancement of local biodiversity and improvements to the adjacent ecological designations.

#### Alternative Schemes for Renewable Energy

- 5.4.2 Alternative renewable energy developments were considered for utilising the grid connection. Onshore wind turbines / wind farm to generate power were investigated in this location, however the close proximity to RAF Valley and the potential for collision with aircraft and interference with radar present significant constraints. Given the RSPB Valley Wetlands Reserve is located central to the development areas, wind turbines were also not considered suitable due to the potential ornithological impacts. In addition, it is important to consider the residential amenity of nearby dwellings when siting wind turbines. There are a number of residential properties within 500m of the development areas which would significantly constrain any prospective wind turbine development on grounds of noise disturbance and shadow flicker. Therefore, onshore wind turbines were discounted.

#### Alternative Sites

- 5.4.3 Solar farms require a viable connection to the distribution network. The point of connection is determined by the distribution network operator which is purely based on the sensitivities of the network, therefore the general location of solar farms is not under the control of a developer. Once a point of connection has been identified site specific constraints are assessed as per those identified above (section 5.3).

#### Alternative Configuration of Sites

##### Description of Development Areas Removed from the Proposed Development

- 5.4.4 Chapter 2 of this ES identifies 9 development areas that were initially included in the proposal as shown in **Figure 2.1**, but DAs 1, 2, 3, 7, 8 and 9 were removed from the proposals. Below is an outline description of these areas and a reason for their removal.

##### Development Area 1

- 5.4.5 DA1 comprised six grazing fields and measured 18.1ha. The area is bisected by a small water course that flows from Llyn Traffwll to the west to Afon Crigyll in the east. Land to the north of the water course comprises a single field and rises gently from 5m AOD to 8m AOD south to north. Land to the south of the water course comprises five fields and has a high point of 8m AOD in the south western corner. A rocky outcrop is located centrally within the southern part of Area 1 reaching a height of 11m AOD. The fields within Area 1 are bound by stock fencing and ditches. A bund measuring approximately 1m high runs along the western boundary of Area 1. An overhead power line runs across the site in a north west – south east alignment.

##### Development Area 2

- 5.4.6 DA2 comprised 2 grazing fields that measured approximately 2.1ha. The boundary is demarcated by hedgerows and vegetation. A farm access track to Tai-hirion runs along the eastern boundary. Access is from the highway that forms the southern

boundary.

#### Development Area 3

- 5.4.7 DA3 comprises six grazing fields and measures approximately 13ha. Some of the field boundaries have well established vegetation albeit sparse in some locations. The highest point is 13m above ordnance datum (AOD) located on the southern boundary adjacent to Tai-croesion farmhouse. The land slopes gently northwards to a low point of between 4m AOD and 6m AOD. Along the northern boundary is a ditch/water course that flows into the Afon Crigyll to the west. An overhead electricity pylon enters DA3 but terminates just within its southern boundary.

#### Development Area 7

- 5.4.8 DA7 comprised 3 grazing fields that measured 8.2ha. The boundary is demarcated by hedgerows and vegetation. The north-eastern boundary is demarcated by the A55, adjacent to the south-eastern boundary is Pandy Cymunod a Grade II former woollen mill and workshop. A lane forms the south-western and north-western boundaries. Cymunod is located adjacent to the northern boundary of the Area. The Area falls from north to south having a high point of 20m AOD.

#### Development Area 8

- 5.4.9 DA8 comprised 6 grazing fields that measured c. 8.5ha. The boundary is largely post and wire fencing with some vegetation along the western boundary. Internal field boundaries are post and wire fencing and ditches. A private track providing access to DA9 and the dwelling of Cerrig Cynrig and Cerrig Cynrig Farm and Traffwll bisects the area. On the eastern boundary to the south of the track is large rock outcrop. An overhead power line crosses the Area at this point also. The rocky outcrop is the high point of the site at over 14m AOD. The low point on the northern boundary is 8m AOD.

#### Development Area 9

- 5.4.10 DA9 comprised grazing fields that measured approximately 12ha. The boundary is demarcated by post and wire fencing with sparse vegetation along the western boundary. Internal field boundaries are post and wire fencing. A private track providing access to DA9 and the dwelling of Cerrig Cynrig and Cerrig Cynrig Farm and Traffwll bisects the area. A pond is located centrally to the north of the track and a rock outcrop is located in the eastern most field. Overhead power lines cross over the rock outcrop in the eastern most field. The southern boundary is the high point at 11m AOD and the northern boundary is the low point at 8m AOD.

#### Reasons for Removal

- 5.4.11 As environmental impact assessment work was undertaken the above areas were removed from the scheme as it was considered that the potentially significant adverse impacts of the development on identified receptors could not be mitigated effectively. An overview of the reasons these areas were removed is provided below.
- 5.4.12 The results of the winter bird survey during 2019/2020 and historic survey work confirmed the presence of foraging by post breeding and wintering Chough associated with the Glannau Ynys Gybi / Holy Island Coast SPA on Development

Areas 1, 8 and 9. The impact assessment considered that the traditional foraging habits of the chough could experience a significantly adverse impact from the implementation of the solar arrays in these areas. As a result, it was decided to remove DAs 1, 8 and 9 from the proposal. See **Appendix 11.4** for further details.

- 5.4.13 The Historic Asset Setting Impact Assessment presented in **Appendix 9.4** identified there would be a detrimental impact from DA3 on the setting of the Castellor Hut Settlement, a Scheduled Ancient Monument. As a result, it was decided to remove DA3 from the proposed development.
- 5.4.14 Following initial landscape and visual impact assessment survey work, an amenity buffer of 50m was recommended from residential properties to edge of PV arrays. Once a 50m buffer was in place from Tai-hirion (residential property to the immediate north of DA2 the amount of available land was not viable to accommodate PV arrays and hence removed from the proposal.
- 5.4.15 DA7 was removed from the proposals due to landowner request part way through the initial consultation exercise.
- 5.4.16 The extent of the application site has evolved throughout the EIA process. This iterative approach has allowed the results of pre-application discussions along with the environmental / technical studies carried out to inform the EIA to guide the evolution of the development and allowed the design to be modified in order to avoid or minimise environmental effects where possible.

## 5.5 CONCLUSION

- 5.5.1 It has been demonstrated through the above site selection criteria that there are no suitable and available alternatives within a reasonable distance of the point of connection at the existing Caergeiliog substation. Once the preferred sites (Development Areas 1 to 9) were identified, the EIA and iterative design process necessitated further refinement so that only Development Areas 4, 5 and 6 remain as part of the planning application. The remaining development areas have been through a series of modifications following environmental and technical assessments in order to minimise potential adverse environmental effects and enhance benefits where possible.