

# **AFON LLAN SOLAR PARK**



**Environmental Report**  
**Volume 1 - Main Text and Appendices**  
**February 2020**

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## List of Abbreviations

|                 |                                                              |
|-----------------|--------------------------------------------------------------|
| °C              | degree Celsius                                               |
| £               | Pounds Sterling                                              |
| AHLV            | Area of High Landscape Value                                 |
| AGLV            | Areas of Great Landscape Value                               |
| AOD             | above ordnance datum                                         |
| AONB            | Area of Outstanding Natural Beauty                           |
| AQMA            | Air Quality Management Areas                                 |
| BAP             | Biodiversity Action Plan                                     |
| BGS             | British Geological Survey                                    |
| BoCC            | Birds of Conservation Concern                                |
| BS              | British Standard                                             |
| CDM             | Construction Design and Management                           |
| CFD             | Contract for Differences                                     |
| CEMP            | Construction Environmental Management Plan                   |
| CIRIA           | Construction Industry Research and Information Association's |
| CO              | carbon monoxide                                              |
| CO <sub>2</sub> | carbon dioxide                                               |
| COSHH           | Control of Substances Hazardous to Health Regulations        |
| CPRE            | Campaign for the Protection of Rural England                 |
| CWS             | County Wildlife Sites                                        |
| dB              | decibels                                                     |
| DECC            | Department of Energy and Climate Change                      |
| DEFRA           | Department for Environment, Food and Rural Affairs           |
| DP              | Development Plan                                             |
| DNO             | Distribution Network Operator                                |
| DoE             | Department of the Environment                                |
| DPD             | Development Plan Documents                                   |
| DTI             | Department of Trade and Industry                             |
| EA              | Environment Agency                                           |
| EC              | European Commission                                          |
| EcIA            | Ecological Impact Assessment                                 |
| EH              | English Heritage                                             |
| EHO             | Environmental Health Officer                                 |
| EIA             | Environmental Impact Assessment                              |
| EMP             | Environmental Management Plan                                |
| EMR             | Energy Market Reform                                         |
| ER              | Environmental Report                                         |
| EU              | European Union                                               |
| FiT             | Feed in Tariff                                               |
| GDP             | gross domestic product                                       |
| GLVIA           | Guidelines for Landscape and Visual Effect Assessment        |
| GW              | gigawatt                                                     |

|                          |                                                         |
|--------------------------|---------------------------------------------------------|
| <b>GWh</b>               | gigawatt-hour                                           |
| <b>ha</b>                | hectare                                                 |
| <b>HER</b>               | Historic Environment Record                             |
| <b>HGV</b>               | heavy good vehicles                                     |
| <b>IEEM</b>              | Institute of Ecology and Environmental Management       |
| <b>JNCC's</b>            | Joint Nature Conservation Committee's                   |
| <b>JRC</b>               | Joint Research Centre                                   |
| <b>km</b>                | kilometre                                               |
| <b>kV</b>                | kilovolts                                               |
| <b>kW</b>                | kilowatt                                                |
| <b>kWh</b>               | kilowatt-hour                                           |
| <b>l</b>                 | litres                                                  |
| <b>LBAP</b>              | Local Biodiversity Action Plans                         |
| <b>LCI</b>               | Landscapes of County Importance                         |
| <b>LDD</b>               | Local Development Documents                             |
| <b>LDF</b>               | Local Development Frameworks                            |
| <b>LDU</b>               | Landscape Descriptions Units                            |
| <b>LNR</b>               | Local Nature Reserve                                    |
| <b>m</b>                 | metre                                                   |
| <b>MAGIC</b>             | Multi-Agency Geographic Information for the Countryside |
| <b>mm</b>                | millimetre                                              |
| <b>MW</b>                | megawatt                                                |
| <b>MWe</b>               | megawatt electric                                       |
| <b>NE</b>                | Natural England                                         |
| <b>NFFO</b>              | Non-fossil Fuel Obligation                              |
| <b>NNRs</b>              | National Nature Reserves                                |
| <b>NO<sub>x</sub></b>    | oxides of nitrogen                                      |
| <b>NSR</b>               | noise sensitive receptors                               |
| <b>OS</b>                | Ordnance Survey                                         |
| <b>PIU</b>               | Performance and Innovation Unit                         |
| <b>PPE</b>               | Personal Protective Equipment                           |
| <b>PM<sub>10</sub>'s</b> | particulate matter of less than 10 microns              |
| <b>PPGs</b>              | Planning Policy Guidance Notes                          |
| <b>PPSs</b>              | Planning Policy Statements                              |
| <b>PV</b>                | photovoltaic                                            |
| <b>RO</b>                | Renewables Obligation                                   |
| <b>RPG</b>               | Regional Planning Guidance                              |
| <b>RSPB</b>              | Royal Society for the Protection of Birds               |
| <b>RSS</b>               | Regional Spatial Strategy                               |
| <b>SAC</b>               | Special Areas of Conservation                           |
| <b>SAM</b>               | Scheduled Ancient Monument                              |
| <b>SNCI</b>              | Site of Nature Conservation Interest                    |
| <b>SO<sub>2</sub></b>    | sulphur dioxide                                         |
| <b>SPA</b>               | Special Protection Area                                 |

|               |                                                |
|---------------|------------------------------------------------|
| <b>SSSI</b>   | Site of Special Scientific Interest            |
| <b>SWMP</b>   | Site Waste Management Plan                     |
| <b>TN</b>     | Target notes                                   |
| <b>UK</b>     | United Kingdom                                 |
| <b>UN</b>     | United Nations                                 |
| <b>UNFCCC</b> | Nations Framework Convention on Climate Change |
| <b>USA</b>    | United States of America                       |
| <b>UWS</b>    | Unconfirmed Wildlife Sites                     |
| <b>VER</b>    | valued ecological receptors                    |
| <b>VOC</b>    | Volatile Organic Compound                      |
| <b>W</b>      | Watt                                           |
| <b>ZTV</b>    | Zone of Theoretical Visibility                 |

# 1 Introduction

## 1.1 Purpose of This Report

This Environmental Report (ER) has been prepared by Wessex Solar Energy in support of a planning application for a 9 megawatt (MW) Solar Park to be located approximately 1.9 km to the west of Clydach, Swansea.

The Solar Park will comprise a number of photovoltaic (PV) cells, and associated equipment that will be used to generate electricity for export to the regional electricity grid.

This ER constitutes the results of a study of the potential environmental impacts of the proposed Solar Park on its surroundings, and provides details of the proposed mitigation measures to minimise any adverse environmental impacts identified.

## 1.2 Wessex Solar Energy

Wessex Solar Energy is a development company involved with the development of Solar Park projects in the United Kingdom (UK). The company is looking at a portfolio of sites across England and South Wales for development and has identified the proposed site as being an ideal site for such a project, satisfying, as it does, a number of key criteria for Solar Park projects.

The company draws on the experience of a group of dedicated engineers, environmental scientists and financiers with many years of experience in the renewable energy and conventional power generation sector. Wessex Solar Energy is committed to developing projects in an environmentally responsible and sustainable manner.

## 1.3 The Project

The purpose of the Project is to construct and operate a Solar Park that will generate electricity in a sustainable manner. In addition, the Project would contribute towards the UK's target of producing over 15 per cent of electricity from renewable resources by 2020.

The Solar Park will be located approximately 1.9 km to the west of Clydach, Swansea. The site location is shown in Figure 1.1.

Solar energy is an unlimited energy resource. Solar radiation can be harnessed either to produce hot water, known as a 'solar thermal' projects, or electricity. Electricity can be generated using either PV cells or by arranging reflective surfaces which focus the sunlight onto a single point, which then heats water to produce steam to drive steam turbines.

For the purposes of the proposed development PV cells would represent the preferred technology. PV technology is uncomplicated. The technology is found on most modern calculators and can be used to generate electricity on a large scale. It is increasingly used on rooftop or 'building integrated' schemes in the UK to reduce the carbon footprint of housing or other developments. It has also been commercially proven on large scale multi-megawatt generation plants since the 1990's, particularly in countries such as Germany and Spain.

The proposed PV panels would convert sunlight into electrical energy by generating direct current (DC) which would then be converted to alternating current (AC) for export to the electricity grid.

The Solar Park will comprise approximately 25,000 PV panels. The panels will be capable of exporting up to 9 MW of renewable electricity to the regional grid by converting solar energy into electrical energy. Each panel will be mounted at an angle of between 20° and 35° facing approximately due south with the panels sitting approximately 1m above ground level at their lowest

edge and no taller than 3.5 m (about 11.5 feet) from ground level at their highest edge. The exact details of the size, number and orientation will be confirmed at the detailed design stage following a competitive tendering process.

Inverters will convert the low voltage DC electricity generated by the panels to low voltage AC electricity. Transformers will then increase the voltage of this electricity. The inverters and transformers will be housed in dedicated cabins on site, the location of which is shown on Figure 1.2 along with an indicative site layout. Indicative elevations of these proposed cabins are shown on Figure 4.2a.

A network of cables will connect the transformers to a set of switchgear, housed in a control building on site. Indicative elevations of this proposed control building are shown on Figure 4.2b. From the control building electricity will be exported to the regional grid via a new underground cable to the existing sub station located 1500m south west of the proposed site.

The total area of the project will be 34.3 acres / 13.89 hectares (ha), the majority of which will be occupied by the proposed PV panels themselves that will be spaced so as not to shade each other from the sun.

Construction of the proposed Solar Park is expected to take approximately 4 months. The majority of this work will include installation of the PV panels and the electrical / inverter cabins. The PV panels themselves will be manufactured off-site, as will the inverters and elements of the frames on which the panels will be placed. The frames will be installed on site and the panels will then be secured to the frames. The electrical and inverter cabins will be constructed on shallow concrete foundations and the inverters will be placed onto the foundations using a small crane.

The proposed Solar Park will help to displace electricity currently generated by fossil fuel fired plant and will avoid the emissions of pollutants, including the greenhouse gas carbon dioxide, associated with such plants. The Solar Park will also contribute to regional and national targets for renewable energy generation.

Once operational there will be only limited requirements for staff to visit the site, with the project being monitored remotely. Typically the installation would be inspected by a member of staff twice a month to ensure that equipment was working correctly and to allow for any activities such as grass cutting/trimming etc.

## 1.4 The Environmental Report

An EIA screening request was made to City and County of Swansea Council as to the need or otherwise for a full Environmental Impact Assessment (EIA) to be undertaken for the project with respect to the Town and Country Planning (Environment Impact Assessment) (England and Wales) Regulations 1999, SI 1999 No 293. These Regulations state that any energy industry development including installations for the production of electricity covering an area exceeding 0.5 ha are considered as a Schedule 2 development which may require a full EIA to be undertaken.

The Council, in a screening reply issued on the 27<sup>th</sup> November 2019, noted that they did not consider that a full EIA was required for the project; but that some environmental information should be submitted with any planning application for the project in due course. A copy of the screening reply from the Council is included in Appendix A.

This ER details the findings of the environmental studies requested by the Council and other consultees contacted by the project team. The report is structured as follows:

### **Main Text**

- Section 1: Provides an Introduction to the Project and the assessment process
- Section 2: Covers the Need for and Benefits of the Project

Section 3: Outlines the UK Planning Policy and the Development Plan relevant to the site and the area.

Section 4: Describes the Site and Project

Sections 5 – 11: Cover the various environmental impacts assessed for the Development.

### **Appendices**

Appendix A Local Authority Screening/Scoping Opinion

Appendix B Schedule of Planning Policies

Appendix C Suggested Planning Conditions

Appendix D Archaeological Reports

Appendix E Ecology Appendices

Appendix F Flood Consequence Assessment

Appendix G Landscape and Visual Impact Assessment and Landscape Masterplan

Appendix H Construction Traffic Management Plan

Appendix I Tree Report

Figures referred to in the Main Text are provided in a separate A3 sized volume.

The potential impacts of the construction and decommissioning phase are discussed separately for each aspect of the environmental assessment. Where relevant, the assessment also addresses the impacts of the Solar Park prior to the application of mitigation measures and draws conclusions in relation to residual impacts.

As part of the assessment process, Wessex Solar Energy has identified a number of planning conditions that the company suggest should be included in the planning permission for the Solar Park, should it be granted. These suggested conditions are listed in Appendix C.

The environmental assessments and preparation of the ER have been carried out in accordance with all relevant guidance.

Copies of this ER are available from the following address for a fee of £50 (to cover copying charges). Alternatively, an electronic version is available on CD ROM for a fee of £15 from:

Richard Wearmouth  
Barmoor Farm House  
Morpeth  
Northumberland  
NE61 6LB

A Non-technical Summary is also available, free of charge, as a separate volume.

This ER is also available for public viewing at City and County of Swansea Council offices.

## **1.5 Consultations**

As discussed in Section 1.4 a screening exercise was undertaken for the project with City and County of Swansea Council to determine the need or otherwise for a full Environmental Impact Assessment for the project. The council advised that a full EIA was not required. Nevertheless, to ensure that an appropriate level of environmental assessment work was undertaken Wessex Solar Energy and their

project team have maintained a dialogue throughout the preparation of their planning application with various parties to ensure a robust planning application has been prepared.

#### **1.5.1 Public Consultation**

Communication with the local community and other stakeholders is seen by Wessex Solar Energy as an important part of the development process.

The nature of the development is such that it will have relatively localised impacts when compared to a project such as a wind farm which can be seen over many miles. Wessex Solar Energy therefore informed the relevant community council (Mawr Community Council) on 9<sup>th</sup> December 2019 . At the time of writing this application Wessex Solar Energy has not received any correspondence from Mawr Community Council.

Wessex Solar Energy's consultations will be on-going throughout the development stages of the project.

## 2 Need for the Project and its Benefits

### 2.1 Overview

In Spring 2019 the Welsh Government declared a **Climate Emergency** recognising the significant risks of continuing to emit greenhouse gases to the future wellbeing of our planet. For many years now the development of renewable energy projects in the UK, such as the proposed Solar Park, has principally been driven by initiatives and targets set by successive governments to combat this climate threat.

The adoption of renewable energy power generation as a significant part of our country's energy mix has also been driven by the decline of the UK's indigenous energy supplies and increase in energy imports requires a shift from our current dependence on fossil fuels.

The construction and operation of renewable energy projects, such as the proposed Solar Park, will add to the diversity of the UK electricity generation sector, helping to maintain the reliability of supplies. Solar energy is inexhaustible and is not subject to the instability of the international fuel markets. Solar energy developments eliminate the emissions of the acidic gases and local air quality pollutants associated with the operation of existing fossil fuelled generation plants.

### 2.2 Climate Change

Climate change is one of the most serious environmental problems faced by the world today. It is internationally recognised that the global climate is changing as a result of increasing levels of 'greenhouse' gases in the Earth's atmosphere. Over the last two centuries global atmospheric concentrations of carbon dioxide have grown by nearly 30 per cent, methane concentrations have more than doubled, and nitrous oxide concentrations have risen by about 15 per cent (United States Environmental Protection Agency). This growth is a direct effect of mankind's increased burning of fossil fuels, which, during processing and combustion, give rise to greenhouse gas emissions. These greenhouse gases prevent heat escaping into space, raising the global temperatures as their presence increases.

The last decade was the warmest since records began in 1861. The average global surface temperature has risen by 0.6°C over the 20<sup>th</sup> century, and could rise by 2.5°C in the next 50 years, and by up to 5.8°C during this century, as a direct result of the greenhouse effect, though the impact on global regions will be varied. In some regions these changes could lead to drought, in others increased flooding. It is already evident that the polar icecaps are receding as global temperatures rise, which may lead to an increase in sea levels. In the 20<sup>th</sup> Century, records show that the global mean sea level rose by an average of 1-2 millimetres (mm) a year (United Nations (UN) Working Group of the Intergovernmental Panel on Climate Change).

A report issued by the UK's Office of Science and Technology – Foresight Future Flooding in 2004 estimated that by the end of this century, up to 4 million Britons face the prospect of their homes being inundated directly as a result of climate change. In the UK it is likely that our winters will become warmer and wetter whilst our summers become hotter and drier. Extreme weather events will become more frequent.

The Royal Society for the Protection of Birds (RSPB) have highlighted that *“a staggering number of species could be committed to extinction as a result of climate change – a third or more of land-based plant and animal species by the 2050's if we take no action to limit global warming. Climate change is now the greatest long-term threat to wildlife worldwide”*.

Worldwide the consequences could be devastating with many millions of people exposed to the risk of disease, hunger and flooding. By the middle of the century, 200 million more people may become permanently displaced due to rising sea levels, heavier floods, and more intense droughts.

## 2.3 Tackling Climate Change

The problem of climate change was first addressed in the international arena at the United Nations Conference on the Environment and Development, **the Earth Summit**, in Rio de Janeiro in 1992. One of the major themes of the meeting was promoting sustainable economic development in the face of global climate change. Another was that industrial nations who have contributed the bulk of the greenhouse gas emissions should assume the burden of leadership.

This was followed by further international action in 1997 when worldwide Governments took a further step and agreed on the **Kyoto Protocol**, which upon ratification, would establish legally binding targets for the reduction of greenhouse gases emitted by industrialised countries. Under the Protocol all industrial nations were required to reduce collective greenhouse gas emissions by just over 5.2 per cent from 1990 levels by 2008-12.

More recently, in 2016 the **Paris Agreement** was signed with the central aim of strengthening the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. As part of the agreement the UK committed to a net zero emission target for greenhouse gases by 2050.

In the years since the climate change movement has grown with Governments including the UK parliament and the Welsh Assembly agreeing that there is a **Climate Emergency** in 2019.

Work by the Climate Change Committee in 2019 in response to a challenge from the UK, Welsh and Scottish Governments recommended a series of dramatic targets. In Wales, it was recommended a 95 per cent reduction in greenhouse gases by 2050 was implemented.

## 2.4 UK Climate Change Programme

The **UK Climate Change Programme**, published in November 2000, set out the Government's proposals for meeting the UK's legally-binding target of a 12.5 per cent reduction in greenhouse gas emissions, (Kyoto Protocol) and for moving towards the Government's domestic goal of a 15 per cent reduction in carbon dioxide emissions by 2015. The programme also confirmed the requirement to supply over 10 per cent of UK electricity from renewable sources by 2010 in line with the Renewables Directive (a requirement that the UK failed to meet).

Since this time the UK Government has introduced the Climate Change Bill which aimed to achieve a mandatory reduction of 60 per cent in the carbon emission from the 1990 level by 2050, with an intermediate target of between 26 per cent and 32 per cent by 2020. The bill was passed in to UK Law as **"The Climate Change Act"** on 26 November 2008 and in addition to reductions in 2020 and 2050 targeted an 80 per cent reduction over 1990 as an aspirational target. The U.K. was the first country to ratify a law with such a long-range and significant carbon reduction target.

As referenced above in 2016 the UK signed the Paris Agreement committing to reducing emission of greenhouse gases to net zero by 2050 albeit the agreement is consensus based and not legally binding. Climate Change Committee which was challenged by the Prime Minister to draw up plans to meet the net zero target observed the following:

- *"Fully decarbonising electricity supply can be achieved through increasing the share of renewables and firm low-carbon power from around 50% today to around 95% in 2050....Renewable generation could be four times today's levels, requiring a sustained and increased build out between now and 2050."*
- *Renewables are cheaper than alternative forms of power generation in the UK and can be deployed at scale to meet increased electricity demand in 2050 - we therefore consider deep decarbonisation of electricity to be a Core measure.*

- *Our 2018 Progress Report to Parliament recommended that, in addition to current commitments, a further 50-60 TWh of low-carbon generation would need to be contracted to come online by 2030, in order to reduce emissions to below 100 gCO<sub>2</sub>/kWh (75% low carbon generation)."*

It is clear that the uptake of renewable energy in the UK needs to rapidly accelerate if we are to achieve such aims as part of our international commitments.

Over the years a series of incentive mechanisms and tariff have supported the implementation of renewable energy projects to ensure their lifetime economic viability. However as time has gone on the level of these incentives have fallen significantly such that many schemes are now approaching "grid parity" with electricity acquired on the open market.

With the deployment of renewable energy being far more economic the key barriers to the meeting of our targets and objectives for its uptake are becoming planning constraints and the availability of connections to the local / national electricity grid. Councils like Swansea have the ability to help make sure that planning constraints are not a significant inhibitor in realising our national climate change objectives.

## 2.5 Solar Energy in the UK

Solar energy in the UK until the last 5 -7 years or so has more typically been associated with small installations on residential roof tops and building integrated systems. However, improvements in technology, the introduction of tariffs scheme and significant reductions in costs have made commercial scale solar projects in the UK achievable.

Levels of solar irradiation are typically measured in kilowatt hours (kWh). This is a measure of the amount of solar energy experienced at a given location over the course of an hour. Solar irradiation levels are higher the closer the location of interest is to the equator. Therefore, solar irradiation is highest in the southernmost areas of the UK. This is illustrated by the map below, produced by the European Commission's Joint Research Centre (JRC).

### Insert 2-1: Map of solar radiation levels in the UK



The map shows the average number of kWh of solar irradiation per square metre which would be received over the course of an average year by an optimally inclined solar panel (i.e. tilted between 20-35°). It shows that the areas which experience the highest levels of solar irradiation in the UK are in the south of England, South Wales and East Anglia.

## 2.6 Benefits of the Project

In addition to playing a major role in achieving Government targets for renewable energy and thereby tackling climate change, solar energy has a number of additional benefits for the region and the UK, including:

- Economic benefits – in terms of UK construction and maintenance jobs etc.
- Power supply benefits – by increasing diversity and security of electricity supply.
- Environmental benefits – reduced emissions of pollutants in addition to carbon dioxide

These issues are discussed further below.

### 2.6.1 Economic Benefits

The development of renewable energy schemes presents an economic opportunity both nationally and at a regional and local level. It is estimated by the government in 2017 that £79.6 billion turnover in the UK economy was generated directly and indirectly by businesses active in the low carbon and renewable energy economy.

Solar projects such as that proposed by Wessex Solar Energy can help stimulate business investment in a sector with enormous growth potential.

It is considered that the project will have a beneficial impact with regard to socio-economics in the wider area. The proposed development represents a total investment of the order of £5.5 million in isolation, a proportion of which will be spent in the local area, primarily on civil and electrical contractors. Wessex Solar Energy will encourage the contractor who will construct the project to use locally sourced materials and locally based contractors as part of their proposals so as to maximise the benefit to the local economy.

The potential for investment in new and emerging renewable energy technologies must also be seen against the potential impacts of not taking action to combat climate change. Climate change could perhaps reduce global GDP by 5 per cent year on year 'now and forever' whilst the costs associated with combating global climate change could be as little as 1 per cent of global GDP (Stern Report 2005). The risks to the UK economy such predictions are correct are plain to see and it is considered that it is through projects such as the proposed Solar Park that this threat can be combated.

### 2.6.2 Electricity Supply Benefits

The use of renewable energy, such as that which would be generated from the proposed Solar Park, will add to the diversity of the UK electricity generation sector helping to maintain the reliability of supplies and represents an inexhaustible supply. Renewable energy also has advantages relating to slowing the depletion of finite fossil fuel reserves. North Sea oil and gas supplies have meant the UK in more recent times has been self-sufficient in energy but this cannot be maintained, leaving the country potentially vulnerable to price fluctuations and interruptions to supply caused by regulatory failures, political instability or conflict in other parts of the world.

The Solar Park will also help to reduce the transmission losses associated with the transfer of electricity along long lengths of transmission lines from conventional power stations. As the proposed project will be "embedded generation" (i.e. generating electricity directly into the local Western Power Distribution network) it reduces the distance the electricity travels and reduces these small losses of power. By contrast, energy from large power stations has to be transmitted on high voltage power lines and travels long distances before point of use. The Solar Park will therefore contribute towards the efficiency of the UK distribution system and further reduce the harmful emissions generated by thermal power plant.

There are a number of annual average UK household electricity consumptions quoted by various credible sources. BEIS now estimates the average consumption to be below 4,000 kWh with average consumption in 2017 being about 3,760 kWh. It can be calculated using the 2017 figure that the proposed Solar Park will provide up to 2,646 households with renewable energy annually.

### 2.6.3 Environmental Benefits

In addition to the benefits associated with reduced emissions of greenhouse gases, other external environmental costs of conventional generation are avoided, including poor air quality and the damage to the natural and built environment caused by acid rain, as in addition to the prevention of emissions of carbon dioxide (the main greenhouse gas), the use of solar power prevents the emissions of the acid gases and local air quality pollutants such as sulphur dioxide (SO<sub>2</sub>) oxides of nitrogen (NO<sub>x</sub>), particulate matter of less than 10 microns (PM<sub>10s</sub>) and Volatile Organic Compounds (VOCs). Producing energy from the proposed Solar Park would reduce the quantities of these pollutants being produced in the UK, thus helping the UK government's environmental and social objectives. In addition there is no requirement for fuel transportation.

During operation, the land will be available for use around the PV panels, with sterilised areas of land essentially being the electrical and inverter buildings. Also when compared to conventional power stations, solar parks are easily and quickly decommissioned and any visual impact is totally reversible.

With regard to local environmental issues, the project will, of course, have an impact on the existing environmental baseline at the proposed site, which has been assessed as part of this Environmental Report. However, mitigating measures will be employed to help minimise the impact of the project and, in some cases, improve the existing environment.

## 3 Planning Policy Context

### 3.1 The Planning Framework

The Planning and Compulsory Purchase Act 2004 requires that all planning decisions are 'plan led'. The Act also provides the statutory basis for the 'plan led' system and is particularly important in that it establishes a statutory purpose for planning, namely the achievement of sustainable development. Section 38(6) of the Act states that:

*"...if regard is to be had to the development plan for the purpose of any determination to be made under the Planning Acts the determination must be made in accordance with the plan unless material considerations indicate otherwise".*

In essence any consideration which relates to the use and development of land is capable of being 'material'. The remainder of Section 3 outlines the policy documents and policies contained therein that are material considerations for the Local Authority when determining the planning application for the proposed development.

#### 3.1.1 National Planning Policy

##### 3.1.1.1 National Policy Statements

The UK Government produced National Policy Statements (NPSs) in 2011 to set national objectives for the development of nationally significant infrastructure projects. The NPSs are sector specific documents intended to set the background for planning decisions. Although the proposed solar farm cannot be considered a Nationally Significant Infrastructure Project it can contribute to the objectives of the NPSs, particularly EN-1 and EN-3.

##### EN-1: Overarching Energy

This NPS states the UK Government's commitment to meeting a legally binding target to cut GHG emissions by at least 80% by 2050, compared to 1990 levels.

The policy recognises the need to significantly increase the amount of renewable energy generated in the UK if this target is to be achieved.

##### EN-3: Renewable Energy Infrastructure

The Renewable Energy Infrastructure NPS reiterates the UK Government's commitments as outlined in EN-1.

#### 3.1.1.2 Welsh Renewable Energy Policy

The Welsh Government's Policy Statement "A Low Carbon Revolution: Wales Energy Policy Statement" (March 2010) sets out the aims of the Government's renewable energy policy as well as advice to Local Planning Authorities on its implementation.

The Policy Statement sets ambitious targets for the deployment of renewable energy in Wales. While it is mostly focussed on the development of wind energy projects this is primarily because other forms of renewable energy were not perceived to be widely available or cost effective at the time. Due to technology improvements and cost reductions the deployment of solar energy projects in the UK is now cost effective and is indeed widespread and rapidly expanding.

### **3.1.1.3**      *Wales Spatial Plan*

As a statutory requirement of the Planning and Compulsory Purchase Act 2004 the Welsh Government was required to produce a Spatial Plan for Wales to set out the strategic framework to guide future development and policy in Wales. The Wales Spatial Plan: People, Places Futures was adopted by the National Assembly for Wales in November 2004, covering a 20 year period, and was updated in July 2008.

The Plan aims to align infrastructure investment with spatial development in the 'Swansea Bay – Waterfront and Western Valleys' region, i.e. the region within which the proposed solar farm is located.

### **3.1.1.4**      *Planning Policy Wales (2018)*

The Planning Policy Wales (PPW) document (2018) contains land use planning policies for Wales and sets out the framework for Local Authorities to prepare their development plans and is a material consideration in the determination of planning applications.

The document makes significant references to the need to move to a low carbon, renewable energy based economy in Wales and strongly recognises the issues associated with our changing climate.

It also sets a renewable energy target for Wales to generate 70 per cent of its electricity consumption from renewable energy by 2030, something that will require rapid deployment of projects such as the proposed Solar Park if it is to be achieved.

The document identifies the benefits of renewable and low carbon energy, as part of the overall commitment to tackle climate change and increase energy security recognising it to be of "paramount importance". It goes on to say that:

*"The planning system should:*

- integrate development with the provision of additional electricity grid network infrastructure;*
- optimise energy storage;*
- facilitate the integration of sustainable building design principles in new development;*
- optimise the location of new developments to allow for efficient use of resources;*
- maximise renewable and low carbon energy generation;*
- maximise the use of local energy sources, such as district heating networks;*
- minimise the carbon impact of other energy generation; and*
- move away from the extraction of energy minerals, the burning of which is carbon intensive."*

With specific regard to renewable energy the document starts that:

*"Planning authorities should facilitate all forms of renewable and low carbon energy development. In doing so, planning authorities should seek to ensure their area's full potential for renewable and low carbon energy generation is maximised and renewable energy targets are achieved.....*

*....Planning authorities must develop an evidence base to inform the development of renewable and low carbon energy policies. Planning authorities should:*

- take into account the contribution their area can make towards the reduction of carbon emission and increasing renewable and low carbon energy production;*
- recognise that approaches for the deployment of renewable and low carbon energy technologies will vary;*

- *identify the accessible and deliverable renewable energy resource potential for their area, including heat, and consider the likely utilisation of this resource over the plan period;*
- *assess the social, economic, environmental and cultural impacts and opportunities arising from renewable and low carbon energy development;*
- *take into account the cumulative impact of renewable and low carbon energy development and their associated infrastructure, for example grid connections;*
- *identify criteria for determining applications for sites based on their installed capacity;*
- *engage with the renewable energy development industry and consider the deliverability of schemes;*
- *take into account issues associated with grid connection (see Grid Infrastructure section) and the transportation network; and*
- *consider local and strategic priorities for renewable energy.”*

It is clear PPW in principle strongly supports to battle to combat climate change through the update of renewable energy generation such as the proposed Solar Park.

#### **3.1.1.5**      *Welsh Government – Technical Advice Notes*

The Welsh Government has produced Technical Advice Notes (TANs) which should be read alongside the PPW document, both of which should be taken into account by Local Authorities when they are preparing development plans and determining planning applications.

TANs of relevance to the proposed Solar Park include:

- **TAN 5 – Nature Conservation and Planning:** The TAN describes how Local Authorities should have regard to the need to safeguard ecological characteristics (e.g. protected species). The proposed Solar Park is not predicted to have adverse impacts on habitats or protected species (Section 6 of this ER contains a detailed assessment).
- **TAN 6 – Agriculture and Rural Development:** This TAN outlines how Local Authorities should consider the quality of agricultural land as well as other agricultural aspects. The proposed Solar Park is not predicted to have adverse impacts on high quality agricultural land (the land within the site boundary is understood to have an agricultural land classification of 3 or 4 and has a low fertility). The land is currently grazed by sheep and this will continue following construction of the Solar Park.
- **TAN 8 – Renewable Energy:** This TAN provides a number of recommendations for Local Authorities to consider when determining applications for renewable energy developments. Specifically relating to the solar PV developments the TAN states that “Other than in circumstances where visual impact is critically damaging to a listed building, ancient monument or a conservation area vista, proposals for appropriately designed solar thermal and PV systems should be supported” (Section 7 of this ER contains a detailed assessment of potential impacts on cultural heritage assets and concludes that there will be no unacceptable adverse impacts on such assets.)
- **TAN 18 – Transport:** TAN 18 provides guidance on the integration of transport and land use planning; integration between different types of transport; integration of transport policy with policies for the environment, education, social justice, health, economic development and wealth creation. Section 10 of this ER provides an assessment of the potential impacts of the development on the transport network and Appendix H provides further details on the proposed management of construction traffic.

### 3.1.2 Local Planning Policy

The Development Plan relating to the proposed development is the Swansea Local Development Plan 2010-2025 which was adopted on 28th February 2019 provides an up to date planning framework to guide and inform development proposals.

Examination of the Plan identifies the following policies as being relevant in some form to the proposed Solar Park and the site on which it would be located:

- *Policy PS 2: Placemaking and Place Management*
- *Policy HC1 Historic and Cultural Environment*
- *Policy HC 2: Preservation or Enhancement of Buildings and Features*
- *Policy ER 1: Climate Change*
- *Policy ER 2: Strategic Green Infrastructure Network*
- *Policy ER 6: Designated Sites of Ecological Importance*
- *Policy ER 8: Habitats and Species*
- *Policy ER 9: Ecological Networks and Features of Importance for Biodiversity*
- *Policy ER 5: Landscape Protection*
- *Policy CV 2: Development in the Countryside*
- *Policy T 5: Design Principles for Transport Measures and Infrastructure*
- *Policy T 7: Public Rights of Way and Recreational Routes*
- *Policy EU 1: Renewable and Low Carbon Energy Developments*
- *Policy RP 2: Noise Pollution*
- *Policy RP 3: Air and Light Pollution*
- *Policy RP 5: Avoidance of Flood Risk Policy*
- *RP 12: Sustainable Development of Mineral Resources*
- *Policy RP 13: Safeguarding Minerals*

The policies are replicated in Appendix B in full. Below a commentary on the relevant parts of the policies is provided.

#### Policy PS 2: Placemaking and Place Management

Most of the policy relates to housing and other buildings however it does make reference to ensuring that no significant adverse impact on natural heritage and built heritage assets result from development. It also talks about making sure that resilience is not undermined and does not result in significant risk to human health, well-being or quality of life.

It is considered that the project as proposed does not impact in any significant way on natural and built heritage as addressed in the Cultural Heritage and Geology sections of this report. Similarly there is no risk to human health or quality of life.

#### Policy HC1 Historic and Cultural Environment and Policy HC 2: Preservation or Enhancement of Buildings and Features

These two policies seek to protect the cultural heritage of the County with the aim of making sure that development proposals do not impact on heritage features such as Listed Buildings, Conservation Zones and Scheduled Ancient Monuments etc.

The Cultural Heritage section of this report addresses the potential impacts on such receptors as well as the potential impact to any subsurface archaeology etc. It has concluded that there are no unacceptable risks brought about by the proposed Solar Park.

#### Policy ER 1: Climate Change

Through this policy the Development Plan strongly supports efforts to combat climate change, it highlights that the council is “Promoting energy and resource efficiency and increasing the supply of renewable and low carbon energy”.

The policy clearly strongly favours the update of renewable energy schemes such as the proposed Solar Park.

#### Policy ER 2: Strategic Green Infrastructure Network, Policy ER 6: Designated Sites of Ecological Importance, Policy ER 8: Habitats and Species; and Policy ER 9: Ecological Networks and Features of Importance for Biodiversity

These 4 policies focus on various forms of ecological protection and enhancement be it of habitat of specific to species. The policies promote mitigation of the potential ecological impacts of projects and seek a net gain in terms of biodiversity.

Solar Parks such as that proposed at Afon Llan have the potential to impact on onsite ecology however with carefully planned mitigation and biodiversity enhancement schemes they offer the opportunity to create a significant net ecological benefit. A series of enhancement and mitigation proposals are included in the proposals for the Solar Park as detailed in Section 6 with the proposals considered to be in compliance with the 4 policies above.

#### Policy ER 5: Landscape Protection

The Policy seeks in particular to protect Special Landscape Areas identified within the Development Plan. Potential impacts on these areas are discussed in Section 5 which concludes that with suitable mitigation the proposals would not have significant landscape impacts.

#### Policy CV 2: Development in the Countryside

Primarily the policy addresses buildings in the country side however aspects of it are relevant to the Solar Park proposals. By their very nature solar parks require large areas of open space which are generally only available in the open countryside. The proposed development site has been selected as it is in a location which minimises to the extent possible the impact on the countryside. It is located close to a grid connection reducing the need to overhead power lines, is adjacent to an existing solar park and in an area which is generally well shielded from views from the wider landscape.

#### Policy T 5: Design Principles for Transport Measures and Infrastructure; and Policy T 7: Public Rights of Way and Recreational Routes

Policy T5 focuses on the potential for traffic impacts arising from proposed development and how projects should be designed to ensure the allow safe access, do not change the character of country roads, and that where appropriate transport plans are put in place to mitigate the impacts on projects in the construction and operational phases. Policy T7 protects rights of way from development unless suitable alternative arrangements are put in place.

Section 10 of this report includes a assessment of the potential impacts on the road network detailed the means of access to the site and the number of traffic movements in the construction and operational phases. It also addresses rights of way.

No unacceptable impacts on the road network or rights of way are envisaged. A Construction Traffic Management Plan is included in Appendix H.

### Policy EU 1: Renewable and Low Carbon Energy Developments

The Development Plan includes a significant amount of discussion on renewable energy. Policy EU1 identifies Special Search Areas and Local Search Areas for wind and solar schemes. The policy does not appear to prohibit renewable energy projects outside these areas and requires that in all cases any projects seeking permission should be able to demonstrate compliance with the various other plan policies.

The proposed site so far as can be ascertained from the proposals maps and maps that are included in the updated Renewable Energy Assessment (REA) undertaken by the council in 2018 does not only within the small areas of search identified. However a review of the approach taken by the REA study shows that the proposed site does generally match the basic criteria to be an acceptable site.

The REA took the approach of screening out areas where there were sensitive designations such as: AONB; National Nature Reserves; Local Nature Reserves; Ancient Monuments; RAMSAR sites; SACs; Special Protection Areas; Special Landscape Areas (as identified in the DP)

Other features including the following were also factored including; railway lines and stations; urban areas; Adopted roads; footways and cycle paths; and Rights of way and Rivers. Areas with steep slopes were also discounted as were areas of land with higher value land classifications.

For a reason which is unclear the REA allows for a 10 km area around grid connections which it identifies as being an appropriate up to which solar parks can be located from a grid connection point. This is in fact rare for solar parks which ideally require a connection within the first few km if the grid connection costs are not to be too high as to make the project unfeasible. The proposed site is located very close to a grid connection point for this reason, something which will reduce significantly the impact of connecting the project to the wider electricity infrastructure.

The REA in identifying its areas of search also puts a buffer around existing solar parks of 3.5 km for a reason that is again not clear. This is the only obvious reason why the development site is not otherwise included in the area of search. Solar parks are often not visible for more than a few hundred metres and as the landscape studies in support of this Environmental Report demonstrate that there are no unacceptable cumulative impacts with the solar park adjacent to the development site.

Whilst the proposed site is not located within a area of search in the Development Plan, seemingly due to its proximity to an existing Solar Park, it is felt that there are overwhelming reasons why this is the case. The proposed site is acceptable in all other aspects and compliant with the other Development Plan policies which strongly support the development of renewable energy projects to combat our climate emergency.

### Policy RP 2: Noise Pollution, and Policy RP 3: Air and Light Pollution

Policy RP2 identifies that noise pollution should be minimised or eradicated and that local noise sensitive receptors should not be impacted upon by proposed development. Similarly Policy RP 3 requires mitigation to ensure there is little or no impact to sensitive receptors of any light or air pollution.

Noise impacts are addressed in Section 8 of this report and no inappropriate impacts are predicted. Solar parks by their very nature have few moving parts and any noise that is created dissipates before the site boundary is reached.

Air pollution will be improved in general terms by the use of a clean renewable form of electricity generation. During the construction phase there is the potential for dust creation however as identified in this report there are mitigation measures which would be put in place to ensure no impact was felt

in the vicinity of the site. During the construction phase no artificial lighting will be required. During operation there will be no onsite lighting required.

#### Policy RP 5: Avoidance of Flood Risk Policy

The policy seeks to ensure that development sites are not at risk of flooding and that they would not create a risk of additional flooding on or off site.

A Flood Consequence Assessment is provided in Appendix F. It has investigated the various potential flooding mechanisms at the proposed Solar Park site, and has also considered the potential for flooding due to the development of the proposed Solar Park.

On the basis of this report and NRW flood maps, it is concluded that the entire site falls outside of the 0.1% flood level and is therefore not at risk of flooding.

Consideration of the impact of the development on the runoff from the site has revealed no significant impacts. It has been shown that the impermeable area introduced across the site is small and as such will have a small impact on the runoff from the site. A dedicated drainage network is proposed to allow the interception and infiltration of the flows from new areas of hardstanding. The proposed SUDS will be designed to manage more than the additional volume of surface water runoff and therefore, it is considered that there will be little to no impact on the nearby watercourses and neighbouring sites as a result of the development of the proposed Solar Park.

#### RP 12: Sustainable Development of Mineral Resources, and Policy RP 13: Safeguarding Minerals

The site seems from the proposals maps to be located in an area safeguarded for minerals under RP 12 albeit that the Policy that safeguards minerals in the Plan text itself is RP 13. Policy RP 13 seeks to ensure that areas identified for potential future mineral extraction are not sterilised. It also notes that developments of a temporary nature will only be permitted where it can be demonstrated that the proposal will be implemented and the site restored within a timescale that the mineral is likely to be needed.

The site is crossed east to west by a large transmission line which would prove a significant obstacle in its own right to the use of the land for mineral extraction. Moving the line would be highly costly (the cost would in our experience run to millions of pounds) and given that there are large areas of land available for mineral extraction in the surrounding area it is highly unlikely that anyone would seek to extract at the proposed site.

Wessex Solar Energy and the site owners are not aware of any plans to extract minerals from the site and none have previously been progressed so far as we are aware.

The proposed solar by its very nature would exist only for a period of 40 years and as such is temporary in nature. It is not considered likely that the site would be required for mineral extraction in that time (if ever) and the Solar Park which does not comprise any significant structures would be easily removed at the end of its allotted lifetime.

It is concluded for these reasons that the project is not contrary to this policy from the Development Plan and that the overwhelming need to combat climate change through the installation of renewable energy generation favours the use of the site for the proposed use.

### 3.2 Discussion of Relevant Planning Policy

The project is considered to be compliant with the higher level requirements of the National Policy Statements, Welsh renewable energy policy, the Wales Spatial Plan, Planning Policy Wales and the Welsh Government's Technical Advice Notes. Taken together, these policy documents are considered to support and indeed encourage the development of renewable energy projects such as

the proposed Solar Park where such projects do not have an unacceptable impact on their surrounding environment.

At a local level, the Swansea Local Development Plan provides a list of policies that are relevant to the proposed development. These policies relate to spatial development generally and specifically to the potential impacts of developments on their surrounding environment.

### **3.2.1 The Primacy of the Development Plan as a Material Consideration**

The starting point for determining this planning application is Section 54A of the Town and Country Planning Act 1990 ('the 1990 Act' – as amended by the Planning and Compensation Act, 1991). This requires that planning applications should be determined in accordance with the provisions of Development Plans unless material considerations indicate otherwise.

It is considered that the policies discussed above in the Development Plan are supportive in principle of the proposed Solar Park.

### **3.2.2 Summary of Material Considerations**

As demonstrated above, there are several policies identifying the material considerations to be addressed in the determination of the proposed Solar Park planning application. Considered in the context of other broader issues, these are summarised below:

#### **3.2.2.1 Environmental Protection**

The Development Plan incorporates a range of environmental policies: identifying those landscapes, ecological and cultural designations, which require protection and enhancement. These policies identify the range of environmental factors which solar energy developers need to consider in the impact assessment of their proposals.

The environmental studies undertaken for the proposed Solar Park have included a detailed assessment of ecological issues relating to the project. These studies, discussed in Section 6 have demonstrated that the project will not have an unacceptable impact upon any international, European, nationally or locally designated sites, nor will there be any unacceptable impact upon on-site ecological interests. Wessex Solar Energy's proposals include for some ecological enhancement measures to compensate for any minor adverse impact experienced as a result of the development.

Assessment has been made of Cultural Heritage issues relating to the site, including a review of cartographic, photographic and documentary sources. A geophysical survey was also undertaken and an assessment made of its findings. The assessment has found that the site has little archaeological potential and that the development is unlikely to have any significant impact with regard to archaeological remains. The impact assessment also found that there were likely to be no significant impacts on Listed Building, SAMs or other cultural heritage designations.

The geological, hydrological and hydrogeological aspects of the proposed development have also been assessed in detail in Section 9 of this ER. This has demonstrated that the project will not give rise to any significant impacts to geological, hydrological and hydrogeological sensitivities at the site. In addition the project will not lead to the loss of good quality agricultural land, with the land on which the project will be located being designated as Grade 3 or 4 and with very little loss of land, as the land can continue to be used for agriculture throughout the operational life of the project.

Other environmental issues have also been considered in relation to the various planning policies identified as being relevant to the development such as noise and air quality. In no instances did the environmental assessment find that the project ran contrary to these planning policies.

#### ***3.2.2.2 Residential Amenity***

The need to protect residential amenity is a key concern in the determination of all planning applications.

The proposed Solar Park is not located close to some local properties but views from these properties are generally well screened by existing vegetation and can be further screened by appropriate management of this vegetation. The impacts to these properties with regard to visual amenity are discussed in Appendix G.

With regard to other impacts, such as those on noise and air quality, there are predicted to be no significant effects arising from the proposed development. Solar Parks are inherently quiet once operational and will not result in any perceptible increase in noise levels experienced at local properties. There will be impacts associated with construction noise. However, this will be short term in nature and within acceptable levels as discussed in Section 8 of this ER. Air quality is discussed in Section 11 and will not suffer any significant adverse impact as a result of the proposed development.

#### ***3.2.2.3 Transport Infrastructure***

Wessex Solar Energy, as part of the project development process, has sought to ensure that there is appropriate and safe vehicular access to the site through discussion with the highways authority. Section 10 and Appendix H of this ER describe the transport and access arrangements at the site.

#### ***3.2.2.4 Cumulative Impact***

Consideration of potential cumulative impacts is provided in Section 12. No cumulative impacts are anticipated.

#### ***3.2.2.5 The Suitability of the Site***

There are a number of advantages of the proposed site that make it a suitable location for a Solar Park. These include amongst others:

- Its location in an area of the UK that has a high level of solar radiation and good levels of direct sunlight when compared to other regions;
- The availability of land of a sufficient area to accommodate a 9 MW project which requires of the order of 14-20 ha of land; and
- Proximity to the regional electricity grid such that significant off-site works are not required with the associated environmental and commercial costs.

It is for the above reasons, among others, that the site is considered suitable for the intended use for the proposed Solar Park.

#### ***3.2.2.6 Limited Period of Operation***

The Solar Park would have a lifetime of the order of 40 years after which the site would be fully restored in accordance with the requirements of the Local Planning Authority. Upon the decommissioning of the Solar Park, all its above surface elements could be taken away, leaving no visible trace. Where possible, materials associated with the decommissioning would be recycled. The limited period of operation, and ease of removal of the proposed Solar Park, is therefore considered to be an additional significant favourable material consideration.

### *3.2.2.7 Contribution to National Renewables Targets*

The need for and benefits of renewable energy development at a national and global level are highlighted in Section 2 of this Environmental Report. There are a number of national and international targets for renewable energy development and greenhouse gas emission reduction.

If these targets are to be met a quick, sustained and substantial acceleration is needed in the development of renewable energy projects, with solar energy making an important contribution.

It is considered that solar parks have the potential to help Councils avoid the installation of potentially more intrusive renewable energy projects, such as wind farms, in more environmentally sensitive areas within the area.

### *3.2.2.8 Contribution towards Sustainable Development*

The annual electrical output of the Solar Park is predicted to be of the order of 9,950 MWh. It is calculated (using the methodology in Section 2) that the project will produce enough electricity to power up to 2,646 households with renewable energy annually. Renewable energy developments such as Solar Parks, which provide local supplies from 'green' carbon neutral sources, are very much a demonstration of sustainable development in action. The development of renewable energy is essential if the UK is to achieve our global obligations to reduce greenhouse gasses and safeguard our environment for future generations.

The undoubted benefits of electricity generated from renewable sources, and, therefore, from the proposed Solar Park, is a further highly significant material consideration.

## **3.2.3 Conclusion**

The adopted Development Plan supports the UK and Welsh Government drive to increase the proportion of electricity production sourced from renewables. It is considered that there is a clear national need for projects of this type due to the pivotal role renewable energy, will play in implementing the UK climate change and energy strategy.

The proposed Solar Park is supported to a significant degree by local and national policies and targets to promote sustainable development in general, and renewable energy in particular. It is carefully located so as to minimise its potential environmental impact in visual, ecological and human terms. The site is also well located in relation to connection points on the transmission network, and is fully compatible with the broad environmental and socio-economic ethos of the adopted Development Plan.

This environmental report incorporates an Environmental Assessment of the project based on the requisite legislation and the relevant planning policy framework. It concludes that the project will have no unacceptably adverse environmental impacts and is thus, due to its clear compatibility with both national planning policy, the provisions of the adopted Development Plan and the clear national need for such renewable energy developments, an acceptable proposal.

## 4 The Site and the Project

### 4.1 The Site

The proposed Solar Park is located entirely within the site shown in Figure 1.1, which is centred at Ordnance Survey (OS) Grid Reference 265955, 201127. The site comprises seven fields (pasture), totaling 13.89 ha.

The Development site falls within the jurisdiction of City and County of Swansea. The relevant community council is Mawr Community Council.

The proposed site lies c. 1.9 km from Clydach, Pant-Iassau is approximately 650 m to the south with Felindre 2.4 km to the north west.

There are a small number of scattered houses in the vicinity of the site. The closest of these is Felin-Wen-Court located approximately 60m to the south east, with Cefn Betingau farm complex 100m to the north, Pen-y-fedw about 250 m north east, Maes-eglwys Farm, approximately 330m south west and Llyn-Y-Fan approximately 500m to the north.

No public footpaths or bridleways cross the site or pass near to it.

The majority of the site is southwest facing. At its highest point in the north eastern field the site is 98m AOD and at its lowest point in the south western field is 78m AOD.

The site is not located within any national or international ecological or landscape designation. The nearest ecological designated site is located approximately 2.3 km to the west. This is the Nant Y Crimp Site of Special Scientific Interest (SSSI).

Construction traffic accessing the site would approach from the M4, onto the Heol Maes Eglwys road and along the Rhyd-Y-Pandy Road, before turning off onto the existing farm access into the site. It is proposed that a new access point will be created for operational traffic.

### 4.2 The Project

For clarity the key elements of the development can be summarised as follows.

**Table 4-1: Key Elements of Proposed Development**

| <i>Element of Proposed Scheme</i>         | <i>Details</i>                                                        |
|-------------------------------------------|-----------------------------------------------------------------------|
|                                           | <i>Crystalline</i>                                                    |
| Approximate Number of PV Modules (panels) | c. 25,000                                                             |
| Indicative Nominal Power (per module)     | 400 W                                                                 |
| Number of Inverters                       | Up to 9                                                               |
| Number of Transformers                    | 1                                                                     |
| Control Building dimensions (m)           | 5 (l) x 5 (w) x 4(h). Indicative details are provided in Figure 4.2b. |

|                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Combined Inverter and Transformer cabin dimensions (m) each: | 8.5 (l) x 2.5 (w) x 3 (h) (up to nine cabins, see Figure 4.2a)                                                                                                                                                                                                                                                                                                                                                                           |
| Perimeter fence (m)                                          | 2.5 (h). Indicative details are provided in Figure 4.4.                                                                                                                                                                                                                                                                                                                                                                                  |
| Access Tracks                                                | There will be a need for c. 1.1 km of new on site tracks. It is anticipated that this will comprise aggregate to maintain a suitable access track for construction traffic. Indicative details are provided in Figure 4.3.                                                                                                                                                                                                               |
| Construction Compound                                        | The construction compound area will be 900 m <sup>2</sup> . The compound area will contain areas for the parking of vehicles, storage of materials and a site office including staff welfare facilities.                                                                                                                                                                                                                                 |
| Electrical Connection                                        | The PV panels will be connected to inverters that will convert the direct current (DC) produced by the panels to alternating current (AC) that can be exported to the grid via the switchgear on site. On site cables would be underground.<br>Export of power from the site would be achieved via a new underground cable installed from the control building to the existing substation located 1500m south west of the proposed site. |

#### 4.2.1 Project Description

PV technology is uncomplicated. The proposed Solar Park will comprise of the order of 25,000 crystalline panels are selected. There will also be up to 9 inverters and transformers that will be housed in dedicated cabins.

The PV panels to be used at the site will be of the order of 1600 mm (l) x 1000mm (b) x 50mm (h). The panels will be positioned at an angle of between 20° and 35° and will have a height of no more than 3.5 m from the ground to the top of the panel. It should be noted however that the final selection of the exact type and size of PV panels and the number of inverters will be subject to confirmation through a competitive tendering process.

The competitive tendering process will be undertaken to determine the supplier / manufacturer of the PV panels and associated equipment, following receipt of planning permission. There are a number of suppliers / manufacturers of PV panels of the required power output, all with similar characteristics.

For the purposes of this planning application we have endeavoured to quote an upper limit in terms of dimensions and land take, so that the final design, which would be agreed with the Council as part of a planning condition, would be less than that detailed in this application. We believe that this makes the environmental report a 'worst-case' assessment of the potential impacts of the development.

Figures showing the front, side and plan profiles of typical crystalline PV panel designs that could be constructed at the proposed site are provided in Figures 4.1a.

Inverters will convert the low voltage DC electricity generated by the panels to low voltage AC electricity. Transformers will then increase the voltage of this electricity. The inverters and transformers will be housed in dedicated buildings on site, the location of which is shown on Figure 1.2 along with an indicative site layout. Indicative elevations of these proposed buildings are shown on Figure 4.2a.

A network of cables will connect the transformers to a set of switchgear, housed in a control building on site. Indicative elevations of this proposed control building are shown on Figure 4.2b. From the control building electricity will be exported to the regional grid via a new underground cable to the existing substation located 1500m south west of the proposed site.

A geotechnical survey of the site will be undertaken in order to identify the underlying geology for the preliminary design of the PV panel, inverter and transformer foundations / skid mounts, underground trenching and electrical grounding systems, site roads, electrical cables and other miscellaneous infrastructure.

To construct and service the Solar Park a new on site track linking the site access points to the fields and electrical buildings will be required as shown in Figure 1.2. The total length of new access track will be approximately 1.1 km and constructed from compacted stone or aggregate overlain by sand and a plastic Geogrid that will encourage growth of grass over the track post construction. Construction roads will be about 3 m nominal width and will be placed to avoid known ground hazards and environmental constraints at the site, in addition to steep gradients.

The Solar Park would be equipped with a computer control system that would continuously monitor variables such as electrical voltage and current from a central off-site host computer or from a remote personal computer. In the event of any fault at the park the system would be able to alert operations staff. The control system would always run to ensure that the Solar Park operates efficiently and safely.

#### 4.2.2 Project Layout

Throughout the development of the proposed Solar Park, Wessex Solar Energy has sought to minimise the impact of the Solar Park, especially with regard to the impacts associated with landscape and visual amenity and ecology.

The positioning and layout of the PV panels within the site aims to minimise any environmental impacts while maximising the exposure of the panels to the solar resource. Panels will not be equipped with tracking mechanisms which tilt the panels to follow the sun, but instead will be fixed and orientated between 20° and 35° as shown in Figure 4.1.

Figure 1.2 illustrates the proposed general site layout of the key elements as envisaged, subject to any minor micro-siting. These include: the PV panels, the inverter and transformer buildings, the control building and the proposed access track.

As discussed above, access would be achieved via Rhyd-Y-Pandy Road. There would also be on-site access tracks connecting this track with the electrical buildings. An indicative cross-section of the access track is shown in Figure 4.3.

#### 4.2.3 Safety

PV panels are inherently safe, with no moving parts, they are held firmly in position by steel, zinc-plated supports, designed to ensure that the panels cannot become detached, even in the strongest winds.

The inverters and transformer will be designed to meet stringent electricity industry standards. The oil filled transformer will have a specifically designed containment system (i.e. a bund), to ensure that any accidental fluid leak does not result in a discharge to the environment. The transformers will also be equipped with oil level indicators to detect potential spills. If the oil level inside the transformer dropped due to a leak in the transformer tank, an alarm would be activated on the remote control panel and a maintenance engineer despatched to the site to investigate and remedy the situation.

Any waste fluids would be removed from site following each service by a licensed collection service for recycling or disposal.

Warning signs would be installed to alert the public to the danger of entering the inverter and transformer and control building with a 2.5 m security fence erected behind the existing on site hedgerows to ensure no unauthorised access to the site. It is expected that security cameras may also be required to monitor the internal site area (Figure 4.5).

#### 4.2.4 Construction

Following receipt of the planning permission and award of construction contracts, it is anticipated that it could take as little as 4 months to construct the Solar Park.

Wessex Solar Energy may retain the services of specialist advisors with regards to ecology and archaeology for the construction period, if this is considered appropriate at the time.

The contract for supply, construction and commissioning of the Solar Park will be awarded through a competitive tendering process to one or more contractors who may in turn appoint specialist subcontractors. The main contractors and subcontractors will be responsible for all the detailed design, civil construction, manufacture, supply, delivery to site, off-loading, erection, installation and commissioning of the PV panels, inverters and associated structures. The selection of the construction contractor will include an assessment of the contractor's record in dealing with environmental issues and require provision of evidence that it has incorporated environmental requirements into its methods statements.

The main contractors will be responsible for organising the site construction and installation works to the required safety standards and the programme.

Wessex Solar Energy will require, among other things, that the site contractor nominates an Environmental Site Manager and Site Waste Manager for the duration of the construction and commissioning phase.

The contractor would also be responsible for training its personnel in spill prevention and control and, if an incident occurs, would be responsible for containment and cleanup. Spills would be addressed in accordance with the Working Practice Procedures.

An individual will be nominated who will be responsible for the site management and all aspects of the work. An information board will be displayed in a publicly accessible location at all times and will give the name and telephone number of the developer's site representative. Warning signs would be erected to inform and protect members of the general public of the construction works being undertaken.

Construction working hours will be restricted to the following, with no working on Sundays or Bank Holidays:

|                  |                |
|------------------|----------------|
| Monday to Friday | 08:00 to 18:00 |
| Saturday         | 08:00 to 13:00 |

Any deviations from these times will be agreed in advance with the Local Authority.

The principal activities during the construction of the Solar Park include:

1. Constructing the limited site access road and site compound / laydown area (plus any other enabling works);
2. Excavating and constructing the electrical buildings foundations / skid mounts and, if needed, PV module foundations;
3. Constructing and installing of the inverter and transformer / electrical buildings, and installation of PV panel support structures;
4. Transporting and assembling the panel mounting systems;
5. Mounting the PV panels on the mounting systems;
6. Installing the electrical collection system (cables etc);
7. Commissioning and energising the Solar Park; and
8. Site re-instatement and any enhancement measures.

In order to minimise disturbance, the limited site access tracks will be constructed first. This is estimated to take between one to two weeks and would involve the creation of a small area of hard standing / gravel next to which the inverters / transformer would be located. The onsite roads leading to this area would likely comprise a Geogrid, interlocking plastic honeycomb structure that would allow grass to grow on the track whilst still providing a hard surface that would allow access by on site construction traffic.

A temporary wheel washing facility will be installed on site to prevent transfer of soil onto nearby public roads, if found to be necessary.

A temporary site compound would then be constructed for the parking of construction vehicles and equipment, staff vehicles, and the storage of materials including PV panels and other components. A temporary office and welfare facility, including a portaloo would also be installed.

Trenching, installation of underground services and provision of temporary construction facilities and services can then take place.

Once the access tracks and site compound are in place, foundation / skid mount construction would commence. The excavation and construction of the foundations/skid mounts is expected to take approximately 2 weeks.

The delivery of the PV panels would then commence as would the installation of the panel supports and security fence. Supports would be driven in to the ground to a depth of approximately 1.5 m.

After construction has been completed, the laydown areas would be restored as closely as possible to their original condition.

The construction contractor will provide his own skips which will be clearly labelled and designated for a specific type of waste. Any recyclable waste will be taken off site for reprocessing where possible. All skips will be kept covered to reduce dust being blown around the site. It is not anticipated that soils will need to be removed from the site following the creation of any foundations for the electrical buildings but will instead be used for any site re-instatement works following the completion of construction.

A construction workforce of up to 50 personnel is expected. However, it is not expected that all workers would be on site at any one time. The peak workforce would be on site during the busiest construction period, when multiple disciplines of contractors complete work simultaneously. Local contractors will be encouraged to tender for the civil and electrical works. Electricians, riggers, crane operators and heavy equipment operators will also be required.

#### **4.2.5 Operations and Maintenance**

The Solar Park is expected to have an operational life of approximately 40 years.

The operation of the Solar Park will be undertaken in accordance with an Operational Environmental Management Plan (EMP).

The Solar Park will be unmanned. Its performance would be automatically monitored from a centralised control room, which would be off site.

The availability of the PV panels to operate will be close to 100 per cent of daylight hours. Forced outages can occur due to the malfunction of mechanical or electrical components or computer controls, although this would be very infrequent.

The site would be visited typically twice a month for routine visual inspections, giving a total manpower requirement, when servicing is included, of approximately 20 hours per year. As far as is practical, short term routine maintenance procedures would be undertaken during winter periods to minimise the impact on electricity generation. Any major maintenance / servicing would be similarly timed.

In the event of a fault, the modular design of solar panels allows them to be rapidly replaced.

The electrical equipment (the inverters, transformers and switchgear) will require annual visual inspections. This does not affect availability of the project. On a 3 yearly basis, testing and calibration of the equipment would require a short break in operation.

A sign would be located at the access point to site and would provide information about the installation and contact telephone numbers.

#### 4.2.6 Decommissioning

Compared to other power generation technologies, solar parks can be easily and economically decommissioned and removed from site at the end of their economic life with the site returned to its original condition. There would be little or no trace that the Solar Park had existed following decommissioning.

There are several aspects of the decommissioning phase which may have environmental effects. The main activities will comprise:

- Removal of PV panels, inverter and associated equipment;
- Reuse / recycling / disposal of the above; and
- Removal of cable and ancillary structures.

Decommissioning must take account of the environmental legislation and the technology available at the time. Notice will be given to the Local Authority in advance of the commencement of the decommissioning work. Any necessary licences or permits would be acquired.

Wessex Solar Energy would develop a decommissioning plan at the appropriate time with the necessary works being undertaken in accordance with a Working Practices Procedure. The details of the Working Practices Procedure would be agreed not less than 12 months prior to decommissioning. This would be the subject of a planning condition.

The first step of decommissioning would be to make the site safe for work in accordance with the normal safety procedures, such as the issue of permits to work. The Solar Park would be de-energised in conjunction with the DNO. Once the site is completely disconnected, it will be handed over to a competent contractor (or contractors) to complete the dismantling and demolition work. The lead contractor would produce safety and environmental management plans for the work.

It is probable that most of the equipment will be at the end of its useful operating life and will be obsolete and unsuitable for further use. It will therefore need to be dismantled for recycling. Decisions on reuse of plant items, recycling of materials or the disposal to waste will be made at the time of decommissioning in the light of the technology then available, environmental and economic considerations and legislation. Unsalvageable material will be disposed of at a licensed landfill. A small crane would be required to dismantle the equipment.

The foundations would be removed to a depth of 1 m below grade or else entirely removed and the soil surface would be restored to its original condition. Disturbed areas would be re-vegetated as appropriate. Access tracks may remain in situ following decommissioning, having enabled vegetation to grow through the geo-membrane throughout the life of the project.

Disposal of all waste materials will only be via appropriate and authorised routes.

Decommissioning would be timed to minimise its environmental impact, for example by avoiding the bird breeding season.

## 5 Landscape and Visual

### 5.1 Landscape and Visual Impact Assessment

A landscape and visual impact assessment has been undertaken to determine the likely effects of the proposed Solar Park on the landscape and visual amenity of the surrounding area. This assessment is included in Appendix G. The study has sought to assess the significance of effect of the development by considering the sensitivity of the landscape and visual receptors, against the magnitude of change that would occur in the landscape as a result of the development.

The assessment concludes that ;

- The site is enclosed by hedges, hedgebanks and riparian woodland. The individual fields are enclosed with further hedges and occasional trees.
- Changes to the fabric of the landscape are the insertion of rows of pv panels up to 3.5m high, nine inverters 3m high and a control room 4m high. Boundary hedges plus any internal ones needed to ensure visual screening will be grown on to 3.5m high. A new entrance gate, similar to that at the entrance to Cefn Bettingau Solar Park, around 100m further north along Rhydd-y-Pandy Road, will replace the existing field gate at the northeast corner of the site. New native hedgerows will be planted to deflect and in due course block views into the site from this entrance. All existing hedges will be gapped up as necessary.
- Although NPPW10 accepts that in encouraging renewable energy in the face of climate change there will be landscape change, there is in fact very little landscape change involved in this proposal.
- Similarly the strong landscape structure of the Afon Llan valley and the relatively sparse population, means there are few views from sensitive receptors. There are no highly sensitive receptors. Those of medium sensitivity comprise views from non-living accommodation from a handful of dwellings and optional views within a deep, wide panorama from nearby Common Land at Gelliwastad. All these are secondary views.
- This proposal will add another solar park to others that are partially visible within the valley woodlands from vantage points such as Gelliwastad. However this is an optional path and an optional viewpoint.

Taking the assessment into consideration the landscape design proposals for the site (also detailed in Appendix G) are for a key intervention in accordance with LandMap observations and recommendations, fitting into the landscape character assessment for the locality, while maintaining screening of the operational area. The strategy also enhances the value of the site for wildlife. Alongside this, ditches and swales will be maintained to diversify wet and aquatic habitats. The interior of the operational site will continue to be grazed or will be mown. At the end of the 40 year period the site will be cleared of all unwanted structures and returned to agriculture.

### 5.2 Glint and Glare

Wessex Solar Energy, as part of our environmental assessments has undertaken a review of the potential for Glint and Glare as a result of the proposed development and the effects (if any) on local properties, road users and other such receptors.

To ascertain the impact it is first necessary to define the impact. Glint is defined as the direct reflection of the sun from the PV panels. Glare is defined as the continuous source of brightness, which is not the direct reflection of the sun but the reflection of a bright sky.

Glint could be considered as having an impact on the surrounding area, while glare is considered so diffuse and so weak as to have no significant affect to any receptor. Given the lack of impact associated with glare this is not considered further in the assessment outlined below.

### 5.2.1 Methodology

The proposed solar array has been subject to 3 dimensional modelling to identify whether, and if so where, glint may occur.

The modelling has been carried out for panels aligned facing south at an angle of 25 degrees to the horizontal. The modelling has been conducted across the entire year. 304 potentially sensitive receptors were selected for analysis.

The locations of these receptors are shown in Figure 5.2 and 5.3. They include:

- 258 residential properties;
- 20 points along 5 roads;
- 22 points along 26 footpaths;
- 4 points at Listed Buildings.

These receptors were identified during site visits and with reference to the Zone of Theoretical Visibility (ZTV)<sup>1</sup> for the Solar Park. They were also selected as representative points surrounding the site in order to provide an indication of the potential zone of impact for glint effects.

The analysis was completed for the year 2020 as this is expected to be the year in which construction of the Solar Park will commence. However, the results of this analysis will apply to the other 39 years of operation albeit the specific dates of impact will vary. With this in mind, key points in the solar cycle are discussed in this sub-section and the data is considered to be representative of the operational lifespan of the Solar Park.

The key points of the solar cycle in relation to glint are:

- **The longest day** - represents the worst case scenario as this is when the greatest glint would occur
- **The autumn equinox (plus one day)**<sup>2</sup> - The time at which the sun rises at north 90 degrees east and sets at north 90 degrees west.
- **The shortest day** - represents the best case scenario as this is when the least glint would occur
- **The spring equinox (minus one day)**<sup>3</sup> - The time at which the sun rises at north 90 degrees east and sets at north 90 degrees west.

The sunrise and sunset times for these periods at the proposed site are set out below. These times remain the same each year:

#### Longest Day

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<sup>1</sup> A ZTV is a diagram which is produced as the output of a computer model which predicts where a development may be visible from within a given radius. This model uses topographical data and detailed data relating to the proposed development to make these predictions but does not take into account existing vegetation and existing buildings and infrastructure.

<sup>2</sup> Due to the latitude of the site and the refraction of the sun's rays through the atmosphere the sun does not appear to rise and set at a 90 degree angle during the true equinox but one day later.

<sup>3</sup> Due to the latitude of the site and refraction of the sun's rays through the atmosphere the sun does not appear to rise and set at a 90 degree angle during the true equinox but one day earlier.

|                    |                     |          |
|--------------------|---------------------|----------|
| Sunrise:           | GMT 0400            | BST 0500 |
| Sunset:            | GMT 2035            | BST 2135 |
| Hours of daylight: | 16 hours 35 minutes |          |

Autumn equinox (plus 1 day)

|                    |                     |          |
|--------------------|---------------------|----------|
| Sunrise:           | GMT 0606            | BST 0706 |
| Sunset:            | GMT 1809            | BST 1909 |
| Hours of daylight: | 12 hours 03 minutes |          |

Shortest Day

|                    |                    |
|--------------------|--------------------|
| Sunrise:           | GMT 0823           |
| Sunset:            | GMT 1605           |
| Hours of daylight: | 7 hours 42 minutes |

Spring equinox (minus 1 day)

|                    |                     |
|--------------------|---------------------|
| Sunrise:           | GMT 0622            |
| Sunset:            | GMT 1826            |
| Hours of daylight: | 12 hours 04 minutes |

The altitude of the sun and the azimuth (its position relative to the southern direction) has been determined and used as an input to the computer model.

## 5.2.2 Basic Principles

Two principles apply to the behaviour of light shining on the panels, one is that light travels in a straight line and the other is that the angle of incidence equals the angle of reflection.

The angle of incidence is the angle formed by a ray incident on a surface and a perpendicular to the surface at the point of incidence (the point that the ray hits the surface).

The angle of reflection is the angle formed by the reflected ray and a perpendicular at the point of incidence.

Examination of the azimuth of the sun on autumn equinox (plus one day), the shortest day and spring equinox (minus one day) shows that the sun rises at north 90 degrees east or greater and sets at north 90 degrees west or greater.

When the sun is at an angle of greater than north 90 degrees east and an angle of greater than north 90 degrees west any reflection from the solar panels is at an angle above the horizontal.

Thus, for a flat site, there can be no glint effect at the surface between the autumn equinox and the spring equinox. This is confirmed by the output from the model.

Due to the proposed site not being flat glint may occur on up to 6 days after the autumn equinox and 6 days before the spring equinox.

Glint can only occur when the sun is in the quadrant between north and east and between north and west

## 5.2.3 Results

Of the 304 receptors analysed, the model shows that it is technically possible for 27 receptors to experience glint during the operation of the Solar Park as detailed in Table 5-1 below. The model

does not account for screening by existing vegetation or buildings. To determine whether glint may actually occur at a receptor an additional qualitative assessment of screening must be completed. The results of this assessment are also included within Table 5-1.

**Table 5 - 1: Glint at Receptors**

| Receptor | Dates between which glint may occur <sup>4</sup>                                                | Duration of glint affect on any one day (maximum) | Time of day (range) | Site Visibility                                                                                                       |
|----------|-------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------|
| G1       | Between 95 and 65 days prior to the longest day<br>Between 67 and 97 days after the longest day | 7 minutes                                         | 6:07 AM and 6:28 AM | Site entirely screened by vegetation between receptor and site.                                                       |
| G2       | Between 95 and 61 days prior to the longest day<br>Between 63 and 97 days after the longest day | 6 minutes                                         | 6:07 AM and 6:28 AM | Site largely screened by vegetation between receptor and site. Limited glint may still be visible through vegetation. |
| G3       | Between 88 and 59 days prior to the longest day<br>Between 61 and 90 days after the longest day | 4 minutes                                         | 6:10 AM and 6:23 AM | Site entirely screened by vegetation between receptor and site.                                                       |
| G4       | 1 days prior to the longest day – 3 days after the longest day                                  | 1 minute                                          | 6:13 AM and 6:14 AM | Site entirely screened by vegetation between receptor and site.                                                       |
| G5       | 19 days prior to the longest day – 21 days after the longest day                                | 2 minutes                                         | 6:10 AM and 6:19 AM | Site entirely screened by vegetation between receptor and site.                                                       |
| G6       | 24 days prior to the longest day – 25 days after the longest day                                | 2 minutes                                         | 6:09 AM and 6:19 AM | Site entirely screened by vegetation between receptor and site.                                                       |
| G7       | 26 days prior to the longest day – 28 days after the longest day                                | 2 minutes                                         | 6:09 AM and 6:19 AM | Site entirely screened by vegetation and buildings between receptor and site.                                         |
| G8       | 30 days prior to the longest day – 32 days after the longest day                                | 2 minutes                                         | 6:09 AM and 6:20 AM | Site entirely screened by vegetation and buildings between receptor and site.                                         |
| G9       | 33 days prior to the longest day – 35 days after the longest day                                | 2 minutes                                         | 6:09 AM and 6:20 AM | Site entirely screened by vegetation and buildings between receptor and site.                                         |

<sup>4</sup> These dates apply to 2014 and will vary by up to 1 day during the 25 years of operation

|     |                                                                                                  |            |                     |                                                                                                                       |
|-----|--------------------------------------------------------------------------------------------------|------------|---------------------|-----------------------------------------------------------------------------------------------------------------------|
| G10 | 28 days prior to the longest day – 29 days after the longest day                                 | 2 minutes  | 6:09 AM and 6:20 AM | Site entirely screened by vegetation and buildings between receptor and site.                                         |
| G11 | 24 days prior to the longest day – 25 days after the longest day                                 | 2 minutes  | 6:09 AM and 6:19 AM | Site entirely screened by vegetation and buildings between receptor and site.                                         |
| G12 | 16 days prior to the longest day – 18 days after the longest day                                 | 2 minutes  | 6:11 AM and 6:19 AM | Site entirely screened by vegetation and buildings between receptor and site.                                         |
| G13 | 21 days prior to the longest day – 22 days after the longest day                                 | 2 minutes  | 6:10 AM and 6:19 AM | Site entirely screened by vegetation and buildings between receptor and site.                                         |
| G14 | 25 days prior to the longest day – 27 days after the longest day                                 | 2 minutes  | 6:09 AM and 6:19 AM | Site entirely screened by vegetation and buildings between receptor and site.                                         |
| G15 | 95 days prior to the longest day – 97 days after the longest day                                 | 8 minutes  | 6:02 PM and 6:29 PM | Site largely screened by vegetation between receptor and site. Limited glint may still be visible through vegetation. |
| G16 | 57 days prior to the longest day – 58 days after the longest day                                 | 10 minutes | 6:08 PM and 6:30 PM | Site largely screened by vegetation between receptor and site. Limited glint may still be visible through vegetation. |
| G17 | 67 days prior to the longest day – 67 days after the longest day                                 | 5 minutes  | 6:02 PM and 6:18 PM | Site entirely screened by vegetation and buildings between receptor and site.                                         |
| G18 | Between 98 and 24 days prior to the longest day<br>Between 24 and 100 days after the longest day | 8 minutes  | 5:55 PM and 6:22 PM | Site largely screened by vegetation between receptor and site. Limited glint may still be visible through vegetation. |
| G19 | Between 98 and 43 days prior to the longest day<br>Between 43 and 99 days after the longest day  | 6 minutes  | 5:55 PM and 6:20 PM | Site entirely screened by vegetation between receptor and site.                                                       |
| RD1 | 25 days prior to the longest day – 27 days after the longest day                                 | 2 minutes  | 6:09 AM and 6:19 AM | Site entirely screened by vegetation between receptor and site.                                                       |

|     |                                                                                                 |           |                     |                                                                 |
|-----|-------------------------------------------------------------------------------------------------|-----------|---------------------|-----------------------------------------------------------------|
| RD2 | 7 days prior to the longest day – 9 days after the longest day                                  | 1 minute  | 6:12 AM and 6:15 AM | Site entirely screened by vegetation between receptor and site. |
| FP1 | Between 95 and 87 days prior to the longest day<br>Between 89 and 97 days after the longest day | 4 minutes | 6:07 AM and 6:27 AM | Site entirely screened by vegetation between receptor and site. |
| FP2 | 44 days prior to the longest day – 46 days after the longest day                                | 5 minutes | 6:03 AM and 6:18 AM | Site entirely screened by vegetation between receptor and site. |
| FP3 | 96 days prior to the longest day – 98 days after the longest day                                | 4 minutes | 6:01 PM and 6:26 PM | Site entirely screened by vegetation between receptor and site. |
| FP4 | Between 71 and 37 days prior to the longest day<br>Between 39 and 73 days after the longest day | 5 minutes | 6:07 AM and 6:22 AM | Site entirely screened by vegetation between receptor and site. |
| LB1 | Between 63 and 43 days prior to the longest day<br>Between 44 and 64 days after the longest day | 3 minutes | 6:09 AM and 6:21 AM | Site entirely screened by vegetation between receptor and site. |
| LB2 | 37 days prior to the longest day – 39 days after the longest day                                | 2 minutes | 6:08 AM and 6:20 AM | Site entirely screened by vegetation between receptor and site. |

### ***5.2.3.1 Residential Properties***

Receptors have been selected within residential areas located around the site. These receptors have been selected taking into consideration the topography, location and building types in the surrounding area and are therefore considered to represent the potential for glint effects at surrounding properties. As shown in Table 5-1, of the 258 residential receptor points analysed 19 may experience glint effects.

When intervening vegetation and buildings are taken into account, the potential for glint effects at 15 of these points is eliminated and at the remaining 4 points it will be significantly reduced from that predicted. At these receptor points, predicted glint effects would occur for no more than 10 minutes on any one day. Glint effects are predicted to occur in the early morning between 6:07am and 6:28am and in the early evening between 5:55pm and 6:30pm. Such effects would only occur for part of the year and from only part of the site at any given moment. Due to the short duration and time of day

which glint effects are predicted, and taking into consideration the screening benefits of the existing vegetation and buildings, any glint effects on residential properties are not considered to be significant.

#### **5.2.3.2 Road Users**

The road points selected are points at which the site is considered to be most visible by vehicles using these roads. As shown in Table 5-1, of the 20 potential road points analysed, 2 may experience glint effects. When intervening vegetation and buildings are taken into account, the potential for glint effects at these points is eliminated. Furthermore, predicted glint effects would occur for no more than 2 minutes during the early morning (between 6:09am and 6:19am). The transitory nature of any views which would be experienced by moving vehicles further reduces the significance of these potential glint effects. Taking into account the existing screening and worst case predictions for glint effects glint is not considered to represent a significant impact on road users in the vicinity of the site.

#### **5.2.3.3 Public Rights of Way**

The points selected along footpaths are points at which the site is expected to be most visible by members of the public. As shown in Table 5-1, of the 22 potential points analysed, only 4 may experience glint effects. When intervening vegetation and buildings are taken into account, the potential for glint effects at all these points is eliminated. Predicted glint effects would occur for no longer than 5 minutes on any one day and would occur in the early morning (6:03am to 6:27am) or early evening (6:01pm to 6:26pm). When the transitory nature of any views which would be experienced by people walking or cycling along these public rights of way is considered the potential significance of any glint effects is further reduced. Taking into account the existing screening and worst case predictions for glint effects, glint is not considered to represent a significant impact on pedestrians or cyclists in the vicinity of the site.

#### **5.2.3.4 Scheduled Ancient Monuments and Listed Buildings**

As shown in Table 5-1 of the 4 points selected at listed buildings only 2 may technically experience glint effects. However, when intervening vegetation and buildings are taken into account, the potential for glint effects at these points is eliminated. Furthermore predicted glint effects would occur for no more than 3 minutes in the early hours of the morning (between 6:08am and 6:21am). Taking into account the existing screening and worst case predictions for glint effects, glint is not considered to represent a significant impact upon these cultural heritage assets.

### **5.2.4 Mitigation**

When existing vegetation and buildings are taken into account potential glint effects are not considered to represent a significant impact upon any of the receptors analysed and therefore no additional mitigation is proposed.

### **5.2.5 Conclusions**

The duration of any potential glint effects at the majority of the receptor locations analysed is limited to less than 10 minutes per day. Any glint effects would be experienced for a relatively short period of time for only part of the year, during the early evening or early morning and would be largely screened by vegetation.

No potentially significant glint effects are predicted.

## 6 Ecology and Ornithology

### 6.1 Summary

An ecological impact assessment of the proposed Solar Park has been undertaken comprising a detailed desk study, consultation and field survey.

The proposed Solar Park is located approximately 1.9 km west of Clydach, Swansea, at Ordnance Survey Grid Reference 265955, 201127. The site comprises of seven fields, totalling 13.89 hectares.

There are no statutory designated sites within 2km of the proposed Solar Park.

There are twenty-two non-statutory designated sites within 2km of the proposed Solar Park.

An Extended Phase 1 Habitat Survey and desk study was undertaken in June 2019 to determine the potential for notable and protected species and habitats within the site and the surrounding area.

Middle Llan SINC, site habitats, flora, amphibians, reptiles, birds, bats and dormouse were considered to be Valued Ecological Receptors (VERs) as they were deemed to be important at local level.

In built mitigation has been incorporated into the proposed development to ensure VERs are safeguarded as far as possible during the proposed development and to provide biodiversity net gains through habitat creation and enhancement; this is consistent with local and national planning policies and advice.

It is anticipated that there will be no significant effects arising as a result of the proposed Solar Park in relation to nature conservation.

### 6.2 Introduction

This chapter of the ES covers the assessment of likely effects on ecology and nature conservation arising as a result of the proposed Afon Llan Solar Park development and relevant surrounding areas.

The chapter describes the assessment methodology which includes a summary of the baseline conditions for the proposed Solar Park site and immediate surroundings, the value of the ecological resources, the mitigation measures and biodiversity enhancements built in to the proposal and the likely significant effects associated with the proposed Solar Park after these measures have been applied.

The proposed Solar Park lies approximately 1.9 km west of the town of Clydach, Swansea. Pantlassau is approximately 650m to the south with Felindre approximately 2.4km to the north west, at Ordnance Survey Grid Reference 265955, 201127.

The proposed Solar Park comprises seven fields, totalling 14.2ha. There are a small number of scattered houses in the vicinity of the site. The closest of these is Felin-Wen-Court located approximately 60m to the south east, with Cefn Betingau farm complex 100m to the north, Pen-y-fedw about 250 m north east, Maes-eglwys Farm, approximately 330m south west and Llyn-Y-Fan approximately 500m to the north.

The majority of the proposed Solar Park is southwest facing. At its highest point in the north eastern field the site is 98m AOD and at its lowest point in the south western field is 78m AOD.

The site is not located within any national or international ecological or landscape designation. There are also no statutory designated sites within 2km of the proposed Solar Park.

The proposed development is for the installation of photovoltaic cells (PV) to be constructed within the site boundary. Further details of the proposal can be viewed in Section 4 of the EIA.

## 6.3 Assessment Methodology

Ecological receptors including designated sites and protected / notable habitats and species, which could be affected by the proposed Solar Park have been identified through a desk-based assessment of available records, published sources and ecological survey work undertaken in June 2019 by SK Environmental Solutions Ltd. From this information, the potential 'Ecological Zone of Influence' (EZol) relating to the Proposed Development has been established.

The assessment has been undertaken in accordance with the Chartered Institute for Ecology and Environmental Management (CIEEM) guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018).

### 6.3.1 Baseline Methodology

#### Study Area

The proposed Solar Park is defined by the application red-line boundary (see Plan A and Figure 1.2).

To inform the scope of the assessment, consideration has been given to the Ecological Zone of Influence (EZol) of the proposed development. The EZol is defined as an area over which important ecological features may be affected as a result of biophysical changes caused by the proposed Solar Park and associated activities. The extent of such changes will typically reduce as the distance from the proposed Solar Park increases, and whether effects are experienced is dependent on the sensitivity of individual habitats, species or other ecological features. As such it is problematic to define a specific EZol which captures all potential effects arising from the proposed Solar Park on all ecological features that may be present and different search areas/study areas have been used for different species/habitats. The EZol for the ecological features, which were subject to specific desktop or site survey work, are set out below.

The Extended Phase 1 Habitat Survey undertaken by SK Environmental Solutions Limited (June 2019), was undertaken within proposed Solar Park site itself and immediately adjacent habitats where possible / relevant.

#### Ecological Zones of Influence

- Statutory and non-statutory designated sites within 2 km;
- Records search for protected and notable habitats and species within 2 km; and
- Extended Phase 1 Habitat Survey – the Site and immediate surroundings.

#### Desk Study

A desktop study was undertaken in June 2019 and involved conducting database searches for statutory and non-statutory designated sites, including Ramsar Sites, Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Sites of Special Scientific Interest (SSSIs), as well as other features of interest located within and surrounding the proposed Solar Park up to 2km from the red line boundary as shown on Figure 6.1 – Extended Phase 1 Habitat Plan.

The baseline conditions are based on a review of existing available information, which included the following:

- Multi-Agency Geographical Information for the Countryside (MAGIC) website;
- Ordnance survey mapping, including historic maps (to identify potentially notable habitats and past land use);

- Aerial photography (to identify potentially notable habitats and past land use);
- UK Biodiversity Action Plan;
- Swansea Local Biodiversity Action Plan (reflects the aims and objectives of the national plans for the habitats and species found in the local area); and
- Consultation Data (including records of protected / notable species and habitats and non-statutory sites within 2km) provided by South East Wales Biological Records Centre (SEWBRc) ;

## Field Survey

SK Environmental Solutions Limited undertook an Extended Phase 1 Habitat Survey of the proposed Solar Park and immediate surroundings on 24<sup>th</sup> June 2019.

The field survey broadly followed the 'Extended Phase 1 Habitat Survey' methodology as set out in 'Guidelines for Baseline Ecological Assessment' Institute of Environmental Assessment, 1995 , which is a development of the method described in the 'Handbook for Extended Phase 1 Habitat Survey – a technique for environmental audit' Joint Nature Conservation Committee, 1990 .

The Extended Phase 1 Habitat Survey provides information on the habitats within the proposed Solar Park and identifies actual or potential presence of legally protected or otherwise notable species in or immediately adjacent to the proposed Solar Park. The main habitats were mapped and are shown at an appropriate scale on Figure 6.1 – Extended Phase 1 Habitat Plan.

Target Notes were taken to provide a more detailed description of a particular habitat in terms of species composition or as a means of highlighting a particular feature of ecological interest; these are provided in Appendix E1.

Plant names follow 'New Flora of the British Isles' (Stace, 2010). The common and scientific names of all botanical species identified are provided when first mentioned in the text, but only the common name is stated thereafter.

In addition to establishing the baseline ecological interest within the proposed Solar Park, the survey also identified areas where further surveys may be required during the appropriate season for legally protected or national/local BAP species. No further surveys were recommended for the proposed Solar Park, however, a precautionary approach has been taken wherever suitable habitat exists within or adjacent to the proposed Solar Park.

## Limitations

It should be noted that the data search provided information on habitats and species already recorded and cannot be taken to represent a complete overview of all species present in the survey area. It is considered that the historic records coupled with the site visit provide a robust review of the potential presence of various notable / protected species and habitat types at the proposed Solar Park and have allowed a general assessment of the proposed Solar Park's potential nature conservation value to be made and therefore this was not considered to be a limitation.

The survey was conducted on a single day in June 2019 and therefore seasonal trends and inherent variations in ecosystem dynamics mean that some species of flora and fauna may not have been recorded. However, the purpose of the survey was to record habitat types and not to provide a comprehensive species list, therefore this was not considered to be a significant limitation.

### 6.3.2 Consultation

Pre-application advice was sought from City and County of Swansea Council with regards to the proposed Solar Park. The response received from the Council dated 10<sup>th</sup> November 2019 identified the following planning policies that are of relevance for ecology and nature conservation:

Swansea Local Development Plan (Adopted February 2019)

*"Policy ER 6 – Development will not be permitted that would result in a likely significant adverse effect on the integrity of sites of international or national nature conservation importance, except in the circumstances specified in relevant legislation."*

*"Policy ER 8 Habitats and species - Development proposals that would have a significant adverse effect on the resilience of protected habitats and species will only be permitted where the need for development outweighs the nature conservation importance of the site; the developer demonstrates that there is no satisfactory alternative location for the development which avoids nature conservation impacts; any unavoidable harm is minimised by effective mitigation to ensure that there is no reduction in the overall nature conservation value of the area. Where this is not feasible, compensation measures designed to conserve, enhance, manage and, where appropriate, restore natural habitats and species must be provided."*

*"Policy ER 9 Ecological Networks and Features of Importance for Biodiversity – Development proposals will be expected to maintain, protect and enhance ecological networks and features of importance for biodiversity. Particular importance will be given to maintaining and enhancing the connectivity of the ecological network. Development that could have an adverse effect on such networks and features will only be permitted where specific criteria are met."*

Planning Policy Wales (PPW)

*"Biodiversity and Resilience of Ecosystems (S6 Duty) (paras 6.4.1 to 6.4.8) - In accordance with s6 of the Environment Act 2016, the Council has a duty to maintain and enhance biodiversity."*

*[NB: In Swansea, the section 6 duty is embedded as one of the 4 Well Being Objectives in the Public Service Board's Well Being Plan – "Working With Nature". It is also included as Objective 6 of the Council's Corporate Plan "maintaining and enhancing Swansea's Natural Resources."*

*The s6 duty means that development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity. In doing so, the LPA must take account of and promote the resilience of ecosystems, in particular the following aspects: diversity, connectivity, scale, condition and adaptability. In fulfilling this duty, the LPA must have regard to S.7 list of habitats and species important for Wales and the SoNaRR and any up to date ecological survey information provided."*

The response also highlighted the following policy and advice with regards to ecological enhancement:

*"Planning Policy Wales (PPW) 10 sets out that "planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means that development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity" (para 6.4.5 refers). Where biodiversity enhancement is not proposed as part of /an application, significant weight will be given to its absence, and unless other significant material considerations indicate otherwise it will be necessary to refuse permission."*

*It is important that biodiversity and ecosystem resilience considerations are taken into account at an early stage in development plan preparation and when proposing or considering development proposals. Planning authorities should be proactive and embed appropriate policies into local development plans to protect against biodiversity loss and secure enhancement."*

*The attributes of ecosystem resilience (PPW para 6.4.9 refers) should be used to assess the current resilience of a site, and this must be maintained and enhanced post development. If this cannot be achieved, permission for the development should be refused.*

*Therefore, any future proposal, as well as undertaking new ecological surveys, should also include some sort of ecological enhancement even if no protected species are found on site."*

This chapter addresses the above policies and advice. It sets out the baseline ecology and assesses the potential effects arising from the proposed development. Habitat mitigation and enhancement measures are described within this chapter and are supported by the Landscape Master Plan (Drawing LL131.02 ).

### 6.3.3 Assessment Criteria and Assignment of Significance

#### Valuation

The evaluation of ecological features and resources has been based on sound professional judgement whilst also drawing on the latest available industry guidance and research. The approach taken in this report is based on that described in 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal' published by the Chartered Institute of Ecology and Environmental Management (CIEEM 2018), whereby important ecological features are identified, and these are considered within a defined geographical context using the following frame of reference:

- International;
- UK
- National (i.e. Wales);
- Regional;
- County;
- District;
- Local; and
- Neighbourhood (site and its vicinity, including areas of habitats contiguous with or linked to those on site).

The valuation of sites makes use of established value systems e.g. Sites of Special Scientific Interest are of national importance and Sites of Importance for Nature Conservation are of county importance. Professional judgement is however required for the valuation of sites of less than district value.

The valuation of species populations, assemblages of species and habitats also uses accepted criteria, examples include:

- Species populations: the importance of populations can be evaluated on the basis of their size, recognized status (e.g. published lists of species of conservation concern, Biodiversity Action Plan (BAP) status) and legal protection status. Bird populations, for example, exceeding 1 per cent of published bio-geographic populations are considered to be of international importance, and those exceeding 1 per cent of published national populations are considered to be of national importance, and so forth.
- Species assemblages: in some instances, it is the species assemblage that is of importance. Criteria of use to evaluate the importance of assemblages included SSSI selection criteria. Fuller (1980) provides a framework for evaluating the relative importance of bird assemblages.

- **Habitats:** criteria for the evaluation of habitats and plant communities include Annex III of the EC Habitats Directive, guidelines for the selection of biological SSSIs and, where available, Local Authority criteria for the selection of Local Sites (e.g. County Wildlife Sites). Legal protection status is also a consideration for certain habitats.

In this assessment, designated sites, species and habitats are considered to be Valued Ecological Receptors (VER) if they meet the following minimum level of importance:

- **Sites** – local importance
- **Species** – local importance
- **Habitats** – local importance

Any potential impacts to identified VERs will be fully considered within this assessment. Any ecological features that do not meet the VER criteria, above, will be scoped out of the assessment. This is because it is considered that no significant effect can occur to features of less than local importance, except where a feature has high social or economic value.

The description and valuation of ecological features has taken account of any likely changes, including, for example, trends in the population size or distribution of species; likely changes to the extent of habitats; and the effects of other proposed developments or land-use changes.

As there can often be a large number of designated sites within 2km of a proposed development site the assessment will commence with those nearest the site as it is anticipated that these will be subject to the most significant impacts as the impacts will be attenuated with increasing distance. If the impacts on this site are significant then each site will be assessed in turn starting with the nearest to the proposed development site until no significant impacts are anticipated.

### Identification and Magnitude of Impacts

The CIEEM guidance also sets out a methodology for the assessment of likely impacts arising from proposed development. The method used in this assessment is based on the CIEEM guidance and is summarised below.

Based on the parameters of the proposed Solar Park, likely impacts have been determined with reference to aspects of the ecological structure and function on which the feature or resource depends. This includes factors such as the available resources, ecological processes, human influences, historical context, ecological relationships, ecological role or function and ecosystem properties. In this context, the nature of the impact has been characterised and considered using the following parameters set out in the CIEEM guidance:

- **Positive or negative** – will the activity lead to a beneficial or an adverse effect;
- **Extent** – the spatial or geographical area over which the impact may occur, the area of habitat or number of individuals affected;
- **Magnitude** – this refers to size, amount, intensity and volume, and should be expressed as quantitatively as possible;
- **Duration** – the time for which the impact is expected to last prior to recovery or replacement, i.e. short-term or long-term, as defined in relation to ecological characteristics (such as a species' lifecycle);
- **Frequency and Timing** – some changes may only cause an impact if they coincide with critical life-stages or seasons, whilst frequent events may cause a greater effect than a single event; and
- **Reversibility** – an effect may be irreversible in that recovery is not possible within a

reasonable timescale or there is no reasonable chance of action being taken to reverse it, i.e. permanent or temporary.

Based on the parameters outlined above, a broad scale has been produced using the terminology summarised in Table 6-1(below):

**Table 6-1: Definition of Magnitude**

| Magnitude  | Definition                                                                                                                                                                                     |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High       | Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).                                                               |
|            | Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).                                               |
| Medium     | Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).                                                    |
|            | Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).                                                                          |
| Low        | Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).                         |
|            | Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial). |
| Negligible | Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).                                                                                      |
|            | Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).                                                                                  |
| No Change  | No loss or alteration of characteristics, features or elements; no observable impact in either direction.                                                                                      |

### Significance of Effects

The effect is the term used to express the consequence of an impact (expressed as the significance of effect), which is determined by correlating the magnitude of the impact to the value of the receptor.

For habitat areas and species, an effect is considered to be significantly adverse if the favourable conservation status of a VER is compromised as a result of the proposed development. Conservation status is defined by CIEEM as being:

- **Habitats** – “conservation status is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area”.
- **Species** – “conservation status is determined by the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area”.

The decision as to whether the favourable conservation status of a VER is likely to be compromised is made using professional judgement based on an analysis of the predicted effects of the development.

A similar process is used for designated sites that are affected by the development, except that the focus is on the effects on the integrity of each site, defined as “the coherence of ecological structure and function, across a site’s whole area, that enable it to sustain the habitat, complex of habitats and/or levels of populations of species for which it was classified.” This assessment is made with reference to the features for which a site has been classified/notified and involves combining assessments of the effects on the conservation status of each of these features.

For non-statutory designated sites, such features may not have been formally defined and will need to be agreed with the designating authority (e.g. local authority or county wildlife trust).

An effect is considered to be significantly beneficial if development activities cause:

- A non-valued ecological receptor to become valued;
- Restoration of favourable conservation status for a habitat/species population; and/or,
- Restoration of a site’s integrity (where this has been previously undermined).

## 6.4 Legislative Framework

Whilst Section 3 discusses the local planning background against which the proposed development will be considered, including relevant nature conservation plans and policies, the following legislation, policy and guidance documents have been used to underpin the ecological impact assessment reported in this Section:

- Habitats and Species Directive (92/43/EEC) 1992;
- Bern Convention (on the Conservation of European Wildlife & Natural Habitats; and on the Conservation of Migratory Species of Wild Animals) 1979;
- The Conservation of Habitats and Species Regulations 2010;
- Wildlife & Countryside Act 1981 (and subsequent amendments);
- Countryside and Rights of Way Act 2000;
- Environment (Wales) Act Section 7 2016;
- Technical Advice Note 5: Nature Conservation and Planning;
- Natural Environment and Rural Communities (NERC) Act 2006;
- Protection of Badgers Act 1992;
- The UK Biodiversity Action Plan (UKBAP) 1994;
- Swansea Local Biological Action Plan (LBAP); and
- Swansea Unitary Development Plan.

Legislation relating to protected species is summarised in Appendix E2.

## 6.5 Existing (baseline) Environment

### 6.5.1 Designated Sites

The desk study (Consultation Data provided by SEWBReC) returned no records of statutory designated sites located within 2km of the proposed development site.

The desk study returned twenty-two records of non-statutory designated sites within 2km of the proposed development site.

- Middle Llan Site of Importance for Nature Conservation (SINC) - located approximately 30m south of the site at its nearest point;
- Rhyd-Y-Pandy Valley and Grasslands SINC – located approximately 325m north;
- Pant Lasau SINC - located approximately 500m south-west;
- Waun Garn Wen SINC - located approximately 720m west;
- Mynydd Gelli-Wasted, SINC - located approximately 780m east;
- Llety-Morfil SINC - located approximately 1.1km south-west;
- M4 Corridor SINC - located approximately 1.3km south;
- Rhos Fawr SINC - located approximately 1.2km north-west;
- Coed Barcud Wildlife Trust Nature Reserve 1.3km north and;
- Ynysforgan Wood SINC – located approximately 1.3km east;
- Cwm Rhydyceirw To Birchgrove Railway SINC - located approximately 1.5km south;
- Homlean Wood SINC - located approximately 1.5km east;
- Llanyfelach Common SINC - located approximately 1.2km south-west;
- Cilfaen SINC - located approximately 1.5km west;
- Llanyfelach Golf Course and Surrounds SINC - located approximately 1.3km south;
- Felindre Grasslands SINC - located approximately 1.5km south-west;
- Cefn Forest Stream SINC - located approximately 1.6km west;
- Penllergaer Forest SINC - located approximately 1.7km west;
- Penllergaer to Llanyfelach Tunnel Railway Line SINC - located approximately 1.7km south-west;
- Pen-Rhiw-Forgan Woods SINC - located approximately 1.8km south;
- Middle Lliw SINC - located approximately 2km north-west; and
- Lower Lliw Reservoir SINC - located approximately 2km north-west.

The non-statutory designated sites are all Sites of Importance for Nature Conservation (SINCs) with the exception of one Local Wildlife Trust (LWT) Nature Reserve. All of the non-statutory designated sites are considered to be of **County importance** for nature conservation.

### 6.5.2 Habitats

The Extended Phase 1 Habitat Plan (Figure 6.1) shows the habitat types recorded within the survey area. Target notes (TN) are used to identify features of particular interest within the survey area (see Appendix E1).

The site extends to approximately 14.2ha of agricultural land currently in use as pasture and meadow. The site comprises seven entire and part fields bounded by hedgerows, tree lines with ditches and, occasionally, by post and wire fencing. The topography of the site is gently sloping, from a high point at the north east (98m AOD) to 20m lower in the south and south west. Afon Llan, a small, tree lined

river that defines the shallow valley bottom, is located approximately 30m from the proposed solar farm boundary at its closest point. The site is located rurally, approximately 8km north of the city of Swansea and c. 2.3km north east of junction 46 of the M4. The landscape immediately surrounding the site comprises a mixture of agricultural land, mostly pasture and meadow, and solar energy parks.

## Grassland

Much of the site comprises moderate quality neutral grassland (TN2) with Yorkshire fog *Holcus lanatus*, sweet vernal grass *Anthoxanthum odoratum*, cock's foot *Dactylis glomerata*, crested dog's tail *Cynosurus cristatus*, perennial ryegrass *Lolium perenne* and false oat grass *Arrhenatherum elatius*. Dry meadow; with cat's ear *Hypochaeris radicata*, selfheal *Prunella vulgaris*, red and white clover *Trifolium sp.*, yellow rattle *Rhinanthus minor*, broadleaved dock *Rumex obtusifolius*, ribwort plantain *Plantago lanceolata*, black medick *Medicago lupulina* and creeping buttercup *Ranunculus repens* fairly homogenously recorded throughout the sward can be found on higher ground to the north east. This grades into wet meadow (TN7) downslope (to the east and south) with bird's foot trefoil *Lotus corniculatus*, ragged robin *Lychnis flos-cuculi*, creeping cinquefoil *Potentilla repens*, ladies' bedstraw *Galium verum* with soft rush *Juncus effusus* and sedges *Carex sp.* recorded. The eastern and western fields had been recently cut at the time of survey and therefore species composition was difficult to survey. The quality of the sward decreases, becoming poor neutral grassland (TN9 and TN20) where it is grazed by cattle to the north and centre of the site.

Hardier herbs such as creeping thistle *Cirsium arvense*, dandelion *Taraxum officianale* agg. and daisy *Bellis perennis* become occasional to frequent. The same can be found to the south-east of the proposed Solar Park site boundary, where horses are paddocked (TN18).

Small, discrete areas of tall ruderals, dominated by bracken *Pteridium aquilinum*, were recorded along field margins and in headlands across the site (TN3).

The grassland habitats within the site are considered to be of **Neighbourhood importance** for nature conservation.

## Trees

Individual and groups of trees are frequent on field boundaries, particularly to the north and west of the site (TN11, TN12 and TN15). The age structure ranges from semi-mature to mature and the species are dominated by pedunculate oak *Quercus robur*, silver birch *Betulus pendulus* and sycamore *Acer pseudoplatanus* with an understorey of rowan *Sorbus aucuparia*, grey willow *Salix cinerea*, holly *Ilex aquifolium* and overgrown hawthorn *Crataegus monogyna*.

Running across the northern boundary of the proposed Solar Park is a line of trees (TN6) which comprises almost entirely of oak, with some holly and grey willow. A dry ditch is present within the tree line with abundant bramble.

The most southerly field, which the proposed Solar Park boundary bisects, close to the Afon Llan, is where the character of trees on site alters to become dominated by alder sp, with willow sp. and birch sp. Two earth banks are present as well as a dry ditch. Royal fern *Osmunda regalis* was recorded in this location (TN14).

The trees are a high-quality landscape/screening feature, with at least one veteran oak tree recorded (TN17). A number of the trees have wind damage and other defects that have the potential to be used by roosting bats (TN13).

The trees within the site are considered to be of **Local importance** for nature conservation.

## Hedgerows

The majority of the hedgerows on site are intact and more than half are species-rich; some may also be considered Important under the Hedgerow Regulations. They are generally earth banked (TN1) and a number have ditches associated (TN4). Woody species are diverse and include pedunculate oak, silver birch, blackthorn *Prunus spinosa*, hawthorn, sycamore, beech *Fagus sylvatica*, hazel *Corylus avellana*, holly, grey willow and rowan. The quality of the hedgerows is reduced under the pylon wayleave that runs east-west across the centre of the site, due to unsympathetic management (TN5). Most had a reasonable hedgerow ground flora associated including bluebell *Hyacinthoides non-scripta*, dog violet *Viola riviniana*, germander speedwell *Veronica chamaedrys* and enchanter's nightshade *Circaea lutetiana*. The hedgerow bounding the east of the site (H1), where it abuts Rhyd-y-Pandy Road, is intact and species-rich with an earth bank on the road side. It is c. 2m in height, dense and reasonably well-managed by tractor mounted flail.

**Table 6-2: Hedgerow Descriptions**

| No. | Hedgerow Description                                                        | Species Rich? |
|-----|-----------------------------------------------------------------------------|---------------|
| H1  | Hazel, blackthorn, oak, hawthorn, ash, sycamore, grey willow, dog rose      | Y             |
| H2  | Hawthorn, hazel, holly, blackthorn, honeysuckle, bramble                    | N             |
| H3  | Hazel, blackthorn, hawthorn, holly, grey willow, beech                      | Y             |
| H4  | Hawthorn, holly, silver birch, oak, hazel, bramble                          | N             |
| H5  | Hazel, hawthorn, elder, holly, alder, grey willow, gorse, bramble, dog rose | Y             |
| H6  | Hazel, hawthorn, oak, holly, blackthorn, elder, bramble                     | Y             |
| H7  | Silver birch, grey willow, oak, holly. Mature oak tree                      | N             |
| H8  | Holly, oak, grey willow, hazel, rowan, hawthorn, ash, ivy, bramble          | Y             |
| H9  | Grey willow, oak, silver birch, holly                                       | N             |
| H10 | Grey willow, holly, honeysuckle                                             | N             |
| H11 | Hazel, silver birch, grey willow, rowan,                                    | Y             |
| H12 | Oak, hawthorn, blackthorn, hazel, ash, holly, grey willow, bramble          | Y             |
| H13 | Oak, hawthorn, grey willow, rowan                                           | N             |

The hedgerows within the Site are considered to be of **Local importance** for nature conservation.

## Water Features

A small stream runs along the western boundary of the proposed Solar Park (TN12). It is shallow with a moderate flow, gravel and cobble substrate with earth banks. This stream drains into the Afon Llan (TN10), which lies c. 30m outwith the southern boundary of proposed Solar Park at its closest point. The river is shallow and flows moderately over a substrate of cobble, gravel and sand, with steep earth banks that are frequently undermined. Alder *Alnus glutinosa* and silver birch trees line the banks and ground flora includes red campion *Silene dioica*, bluebell, wood sorrel *Oxalis acetosella*,

yellow pimpernel *Lysimachia nemorum*, dog violet and wood avens *Geum urbanum*. Elsewhere on site, seasonally wet ditches were recorded along hedgerows and tree lines (TN8).

The water features within/adjacent to the proposed Solar Park are considered to be of **Local importance** for nature conservation.

### 6.5.3 Notable species

A copy of the relevant protected species legislation relating to the proposed Solar Park can be viewed in Appendix E2 – Summary of Relevant Ecological Legislation.

### Flora

SEWBRc returned records of nine notable floral species identified within the 2km search area. The closest of these comprises two records of the royal fern *Osmunda regalis* located approximately 775m east of the proposed Solar Park at its closest point.

Royal fern (a species of Local Conservation Concern) was recorded in a banked tree line at the extreme south west of the proposed Solar Park (TN14) during The Extended Phase 1 Habitat Survey. As the proposed Solar Park is currently relatively intensively managed and the habitats recorded are ubiquitous in the locale, no other flora species of note were recorded.

The presence of royal fern within the site is considered to be of **Local importance** for nature conservation.

### Invertebrates

There were four hundred and thirty-three records of thirty-three species of terrestrial invertebrates within 2km of the proposed Solar Park. Table 6-3 below summarises the butterfly and moth species records. Those listed are UKBAP and Section 7 species (\* indicates UKBAP only).

**Table 6-3: Leptidoptera Records within 2km**

| Common Name                  | Scientific Name              | Number of Records | Species Group |
|------------------------------|------------------------------|-------------------|---------------|
| August Thorn                 | <i>Ennomos quercinaria</i>   | 7                 | Moth          |
| Autumnal Rustic              | <i>Eugnorisma glareosa</i>   | 2                 | Moth          |
| Blood-vein                   | <i>Timandra comae</i>        | 5                 | Moth          |
| Brindled Beauty              | <i>Lycia hirtaria</i>        | 27                | Moth          |
| Broom Moth*                  | <i>Ceramica pisi</i>         | 6                 | Moth          |
| Buff Ermine                  | <i>Spilosoma lutea</i>       | 30                | Moth          |
| Cinnabar                     | <i>Tyria jacobaeae</i>       | 26                | Moth          |
| Dark-barred Twin-spot Carpet | <i>Xanthorhoe ferrugata</i>  | 13                | Moth          |
| Dot Moth                     | <i>Melanchra persicariae</i> | 32                | Moth          |
| Dusky Brocade                | <i>Apamea remissa</i>        | 7                 | Moth          |
| Dusky Thorn                  | <i>Ennomos fuscantaria</i>   | 8                 | Moth          |
| Feathered Gothic             | <i>Tholera decimalis</i>     | 3                 | Moth          |
| Flounced Chestnut            | <i>Agrochola helvola</i>     | 2                 | Moth          |
| Garden Dart                  | <i>Euxoa nigricans</i>       | 2                 | Moth          |
| Garden Tiger                 | <i>Arctia caja</i>           | 5                 | Moth          |
| Ghost Moth                   | <i>Hepialus humuli</i>       | 4                 | Moth          |
| Grey Dagger                  | <i>Acronicta psi</i>         | 1                 | Moth          |
| Hedge Rustic                 | <i>Tholera cespitis</i>      | 2                 | Moth          |

| Common Name                | Scientific Name                 | Number of Records | Species Group |
|----------------------------|---------------------------------|-------------------|---------------|
| Knot Grass                 | <i>Acronicta rumicis</i>        | 28                | Moth          |
| Minor Shoulder-knot        | <i>Brachylomia viminalis</i>    | 4                 | Moth          |
| Mottled Rustic             | <i>Caradrina morpheus</i>       | 3                 | Moth          |
| Oak Hook-tip               | <i>Watsonalla binaria</i>       | 3                 | Moth          |
| Oblique Carpet             | <i>Orthonama vittata</i>        | 1                 | Moth          |
| Rosy Rustic                | <i>Hydraecia micacea</i>        | 10                | Moth          |
| Rustic                     | <i>Hoplodrina blanda</i>        | 9                 | Moth          |
| Sallow*                    | <i>Cirrhia icteritia</i>        | 4                 | Moth          |
| September Thorn            | <i>Ennomos erosaria</i>         | 2                 | Moth          |
| Silver-washed Fritillary*  | <i>Argynnis paphia</i>          | 2                 | Butterfly     |
| Shaded Broad-bar           | <i>Scotopteryx chenopodiata</i> | 2                 | Moth          |
| Shoulder-striped Wainscot* | <i>Leucania comma</i>           | 4                 | Moth          |
| Small Phoenix              | <i>Ecliptopera silaceata</i>    | 33                | Moth          |
| Small Square-spot          | <i>Diarsia rubi</i>             | 13                | Moth          |
| White Ermine               | <i>Spilosoma lubricipeda</i>    | 19                | Moth          |

The uncut meadows and hedgerows were found to support reasonable numbers of common terrestrial invertebrate species during the Extended Phase 1 Habitat Survey. No species of note were recorded though conditions were optimal. The habitats found within the proposed Solar Park are relatively ubiquitous in the local area and the proposed Solar Park is therefore considered to be of only **Neighbourhood importance** in respect to invertebrates. Invertebrates are therefore not considered to be a VER and will not be assessed further within this chapter.

## Amphibians

SEWBRc returned six records amphibian species from within 2km of the proposed Solar Park site boundary, including:

- Three records of common frog *Rana temporaria*, the closest of which is located 400m south of the proposed Solar Park;
- Two records of palmate newt *Lissotriton helveticus*, the closest located 400m south of the proposed Solar Park; and
- One of record of common toad *Bufo bufo*, situated 1.5km south from the proposed Solar Park.

The Extended Phase 1 Habitat Survey did not identify any ponds within the proposed Solar Park although ditches containing seasonal water were recorded. These ditches were not considered to be suitable for great crested newts or other amphibians as vegetation is either absent due to heavy cattle poaching, or over-abundant, causing drying. The stream located on the western boundary is not considered suitable to support great crested newts due to its flow.

The terrestrial habitat quality within the proposed Solar Park is considered to be sub-optimal with regards to great crested newts and other amphibian species as the proposed Solar Park is predominantly pasture, which whilst providing some foraging opportunities, offers little cover. Suitable hibernacula habitat is limited to the hedgerows and boundary tree groups with their associated features; the boundary tree lines/hedgerows have some potential to be used as commuting corridors as they provide connectivity to the wider landscape.

Aerial photography and Ordinance Survey maps were used to identify waterbodies located within 500m of the proposed Solar Park site boundary. Five were recorded as follows (see Plate 1 below for waterbody locations relative to the red line boundary):

- There are two ponds located to the south east of the proposed Solar Park. The nearest, located approximately 70m out with the proposed Solar Park, at its closest point, is approximately 0.05ha in size and surrounded by trees and scrub. The second is located approximately 310m from southeast of the proposed Solar Park at its closest point and is approximately 0.29 ha in size.
- To the north there are two large ponds. The western pond is c. 365m from the proposed Solar Park and is approximately 0.22ha in size and the eastern pond is located approximately 380m from the proposed Solar Park and is approximately 0.11ha in size.
- To the west is a pond located approximately 55m from the boundary of the proposed Solar Park and is approximately 0.09ha in size.



**Plate 1 - Waterbody Locations**

Given that there are no records of great crested newt within 2km of the proposed Solar Park, it is considered unlikely that this species is present within the proposed Solar Park. There are a small number of common amphibian species records located within 2km of the proposed Solar Park, therefore despite the lack of suitable aquatic habitat within the proposed Solar Park site boundary and the terrestrial habitat being sub-optimal, the proposed Solar Park is considered to be of **Local importance** in respect of common amphibians due to the potential role of the hedgerows and tree lines as migration routes.

## Reptiles

SEWBRc returned eleven records of reptile species within 2km from the proposed Solar Park. Three of these are common lizard *Zootoca vivipara*, with the closest record being located approximately 1.3km south-west of the proposed Solar Park at its closest point. Three records of slow worm *Anguis fragilis* were identified, the closest is located approximately 1.6km south-west of the proposed Solar Park at its closest point and five records of adder *Vipera berus* were identified, the closest of these is located approximately 1.6km south-west of the proposed Solar Park at its closest point.

The grassland habitats within the proposed Solar Park are considered to be sub-optimal for reptile species due to low forging potential and a lack of resting and basking opportunities. Suitable hibernacula habitat is limited to the hedgerows and boundary tree groups with their associated features; the boundary tree lines/hedgerows have some potential to be used as commuting corridors as they provide connectivity to the wider landscape.

Although there are records of reptile species located within 2km of the proposed Solar Park, they are all located over 1km away from the proposed Solar Park boundary at the closest point. The proposed Solar Park is considered to be of **Local importance** in respect of reptiles due to the potential role of the hedgerows and tree lines as commuting routes.

## Birds

A large number of bird records (1,135 records of 52 species) were identified during the data search. A summary of those that are notable can be found in Table 6-4 below.

**Table 6-4: Bird species identified within the search area during the desk study**

| Common Name          | Scientific Name             | UK Conservation Status | Schedule 1 | No. of Records | Distance |
|----------------------|-----------------------------|------------------------|------------|----------------|----------|
| Barn Owl             | <i>Tyto alba</i>            | Green                  | Y          | 5              | 1.15     |
| Bullfinch            | <i>Pyrrhula pyrrhula</i>    | Amber                  | Y          | 39             | 0.74     |
| Curlew               | <i>Numenius arquata</i>     | Red                    | N          | 1              | 2.2      |
| House Sparrow        | <i>Passer domesticus</i>    | Red                    | N          | 45             | 1.3      |
| Kestrel              | <i>Falco tinnunculus</i>    | Amber                  | N          | 10             | 2        |
| Little Ringed Plover | <i>Charadrius dubius</i>    | Green                  | Y          | 15             | 1.8      |
| Peregrine            | <i>Falco peregrinus</i>     | Green                  | Y          | 5              | 2        |
| Reed Bunting         | <i>Emberiza schoeniclus</i> | Amber                  | N          | 12             | 0        |
| Shoveler             | <i>Anas clypeata</i>        | Amber                  | N          | 1              | 2.5      |
| Snipe                | <i>Gallinago gallinago</i>  | Amber                  | N          | 5              | 0.34     |
| Song Thrush          | <i>Turdus philomelos</i>    | Red                    | N          | 57             | 0.7      |
| Starling             | <i>Sturnus vulgaris</i>     | Red                    | N          | 50             | 0.67     |

Schedule 1 = Listed on Schedule 1 of the Wildlife and Countryside Act (1981 as amended); Red = Included in Birds of Conservation Concern (BoCC) Red List; Amber = Included in Birds of Conservation Concern (BoCC) Amber List.; Min Distance = Minimum Distance (km) from central grid reference.

A red kite *Milvus milvus* was recorded overhead during the Extended Phase 1 Habitat Survey. The bird was opportunistically hunting small mammals disturbed by the hay cutting that was being undertaken in the eastern field at the time. No ground nesting bird species were recorded during the site survey though the semi-improved neutral grassland habitat has the potential to support those such as skylark. The hedgerows and trees have the potential to support common passerine species.

The site is considered to be of **Local importance** in respect of birds.

## Bats

SEWBRc returned twenty-one records of bats:

- Three records of unknown bat species were identified from field observations, the closest of these were located approximately 1km south-east of the proposed Solar Park boundary at its closest point;
- Two records were provided of unknown pipistrelle bats, the nearest of which was located approximately 650m south of the proposed Solar Park boundary at its closest point;
- Seven records of common pipistrelle *Pipistrellus pipistrellus* were identified, the nearest of which was located approximately 1km north-east of the proposed Solar Park boundary at its closest point. All records are from field observations;
- Four records of soprano pipistrelle *Pipistrellus pygmaeus* were supplied by SEWBRc. The closest of these was located approximately 1.3km to the south-east of the proposed Solar Park boundary at its closest point. All records are from field observations;
- One record of a brown long-eared bat *Plecotus auratus* roost was identified, located approximately 920m north-east of the proposed Solar Park boundary at its closest point; and
- Four records of noctule *Nyctalus noctula* bat were identified by SEWBRc. The nearest record is approximately 920m north-east of the proposed Solar Park boundary at its closest point. All records are from field observations.

The site is considered to provide moderate foraging and commuting habitat for bats as per Table 4.1, of the Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition) (2016). The hedgerows and tree lines provide continuous habitat connected to the wider landscape that could be used by bats for commuting. They also provide foraging habitat in their own right. The proposed Solar Park does not contain any buildings so potential roosting sites are limited to the trees found on the field boundaries. A number of the boundary trees contained features that would be considered suitable for use by roosting bats.

Given the potential roost features in trees, the foraging habitat that is intrinsic to the proposed Solar Park itself and the connectivity that the tree lines and hedgerows on site provide to the wider landscape, it is considered that the site is of **Local importance** in respect to bats.

## Hazel Dormouse

SEWBRc returned two records of hazel dormouse *Muscardinus avellanarius*, both located approximately 2km south of the proposed Solar Park at its closest point.

The hedgerows and mature boundaries on the site are generally intact and reasonably managed, with a diverse range of woody species, including hazel and honeysuckle *Lonicera periclymenum*, two food

plants of the dormouse. That said, hedgerow quality is mixed and there is a lack of dense scrub habitat in these boundary features.

The hedgerows on site are of mixed quality but where they are species-rich, they do contain features that may be attractive to dormice. However, the records of the species are located a considerable distance from Site (dormice rarely travel more than 70m from their nest) with barriers to dispersal such as the Afon Llan between. It is considered unlikely that dormouse would be resident within the Site and therefore presence would be likely limited to commuting/foraging. The Site is considered to be of **Local importance** in respect of dormice.

### Otter and Water Vole

There are four records of otter *Lutra lutra* within 2km of the proposed Solar Park. The closest record of a confirmed sighting is located approximately 1.7km south-west from proposed Solar Park at its closest point.

No records for water vole *Arvicola amphibious* were identified within the 2km search area.

The Afon Llan is a narrow, shallow river with a moderate flow where runs parallel to the site (with evidence of frequent cattle incursion on its southern bank) and is unlikely to support resident water vole along this section, as the species prefer deeper water. The river may be used by otter although no signs of holts or resting up places were recorded during the site survey.

There are no ponds within the site boundary and the ditches on site appear to fill shallowly and ephemerally only. They provide negligible habitat for water voles. The shallow and open nature of the ditches also mean they are unlikely to support commuting otters.

The proposed site is considered to be of **Neighbourhood importance** in respect of water voles and otters. These species are not considered further within the assessment.

### Badger

SEWBRc identified five records of badger *Meles meles* within 2km of the site. Three of these records were road casualties on the M4. One record was of hairs and tracks, the last record of a badger was located approximately 1.2km to the south east proposed Solar Park at its closest point.

Field signs of badger, including tracks, snuffle holes and push throughs at fence lines were recorded occasionally throughout the site during Extended Phase 1 Habitat Survey. Of note was a well-used track into the dense area of scrub that bounds the site in the centre. No evidence of any setts within the hedgerows, tree lines or groups bounding the site were recorded, although the scrub area mentioned above could not be accessed at the time of survey. It would seem that the site is used by badgers for foraging and commuting only. A pre-construction badger survey will be completed across the proposed development site to ensure that no setts have been created since this report was written.

Although the proposed site provides foraging habitat for badgers, the proximity and extent of alternative suitable foraging habitat around the site means that the site is considered to be of only **Neighbourhood importance** in respect of badgers.

### Other Notable Species

Eighteen records of west European hedgehog *Erinaceus europaeus*, which is listed as a Section 7 priority species in the Environment (Wales) Act 2016, on Section 42 of the NERC Act and is known to be in decline, were identified within 2km of the site. One record was of a casualty. The other seventeen were field observations with the closest being located approximately 1km south-east of the site.

One record of a polecat *Mustela putorius* (road casualty on the M4) was also identified. Polecats are listed on Schedule 6 of the Wildlife and Countryside Act 1981 (as amended) which protects them from killing and trapping. This species is also listed in Section 42 of the NERC Act.

The proposed site has some potential to support hedgehog and polecat, particularly within the boundary features. The proposed site also has the potential to be used by European hare *Lepus europaeus*, also a Section 7 of the Environment (Wales) Act 2016, priority species.

The site has potential to support these species, but the habitats are common in the surrounding area and therefore the proposed site is considered to be of **Neighbourhood importance** for hare, polecat and hedgehog.

#### 6.5.4 Assessment of valued ecological receptors

Valued ecological receptors (VERs) are those features/sites that are considered to be valued at the Local level or higher. Only VERs are considered further within this assessment.

A summary of the VERs that have been identified for the proposed development are summarised in Table 6-5 below.

**Table 6-5: Summary of Valued Ecological Receptors**

| Site/Habitat/Species                            | Value  |
|-------------------------------------------------|--------|
| Non-Statutory designated sites (SINC and WTLNR) | County |
| Habitats located within the proposed site       | Local  |
| Royal Fern                                      | Local  |
| Amphibians                                      | Local  |
| Reptiles                                        | Local  |
| Bird species                                    | Local  |
| Bat species                                     | Local  |
| Dormouse                                        | Local  |

## 6.6 Future Baseline Conditions

In the absence of the proposed development, it is not anticipated that the features of the proposed Solar Park would change, although some habitats will mature, and trees will grow taller/larger over time.

Climate change could influence future ecological baseline if changes in temperature were to put stress on local ecosystems. However, changes resulting from climate change will be gradual and over a long period of time. Therefore, within the operational lifeline of the proposed Solar Park any changes would be predicted to be very small.

## 6.7 Mitigation, Compensation and Enhancement Measures Adopted as Part of the Proposed Solar Park

The potential ecological constraints have been taken into consideration at an early stage and as such mitigation and habitat enhancement has been built into the proposed Solar Park design at the outset.

The proposed Solar Park design has been carefully considered so as to avoid potential ecological constraints. The habitats of greatest value on the proposed Solar Park are considered to be the hedgerows and trees. With the exception of a 5.5m section of hedgerow H1, all hedgerows and trees within the proposed Solar Park will be retained within the development. The solar panels and associated structures will be located at least 5m from the edge of all hedgerows/retained trees. It will be necessary to construct an access track, however the access track will be constructed a minimum of 2m from the edge of the hedgerows and will not impact on the root protection area (RPA) of retained trees (if the access track construction is considered likely to impact the RPA of any retained trees then advice will be sought from a suitably qualified arboricultural consultant and a no-dig methodology will be used as necessary). By protecting the hedgerows and tree lines and retaining them within the development the proposed Solar Park complies with Local Plan Policy ER9, which aims to safeguard ecological networks and features of biodiversity importance.

As stated above the proposed development will result in the loss of approximately 5.5m of species rich hedgerow (Hedgerow H1). In order to mitigate for the loss, the retained ends of the hedgebank will be repaired and planted by local craftsmen to maintain the local character of the proposed Solar Park. In addition, 38m of new native, species rich hedgerow will be planted, and all hedgerows will be enhanced through the planting up of 75m of gaps using the species rich native mix (see Table 6-6 below).

**Table 6-6: Hedgerow Species Mix**

| Plant Schedule for new hedges, hedgebanks and all gapping up (except northern boundary which will have increased holly and beech). |             |                             |                     |
|------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------|---------------------|
| Species                                                                                                                            |             | Nursery stock specification | % of mix.           |
| <i>Acer campestre</i>                                                                                                              | Field maple | 60-80cms bare root          | 5%                  |
| <i>Cornus sanguinea</i>                                                                                                            | Dogwood     | 60-80cms bare root          | 5% in damper places |
| <i>Corylus avellana</i>                                                                                                            | Hazel       | 60-80cms bare root          | 10%                 |
| <i>Crataegus monogyna</i>                                                                                                          | Hawthorn    | 60-80cms bare root          | 50%                 |
| <i>Fagus sylvatica</i>                                                                                                             | Beech       | 60-80cms bare root          | 5%                  |

|                              |             |                    |                                               |
|------------------------------|-------------|--------------------|-----------------------------------------------|
| <i>Ilex aquifolium</i>       | Holly       | 2 litre pot grown  | 3%                                            |
| <i>Lonicera periclymenum</i> | Honeysuckle | 2 litre pot grown  | For infilling gaps only.<br>1 in 20 linear m. |
| <i>Prunus spinosa</i>        | Blackthorn  | 60-80cms bare root | 20% in damper places                          |
| <i>Sambucus nigra</i>        | Elder       | 60-80cms bare root | 2%                                            |

The hedgerow planting will result in a net gain for biodiversity as a result of the proposed Solar Park through increased species diversity within the hedgerows and also by increasing the continuity of the habitat and strengthening their value as commuting and foraging routes for a variety of species, increasing ecosystem resilience.

Currently the grassland fields are fertilised to provide grazing for cattle and horses. It is proposed that once the fields come into use, as part of the proposed solar farm, fertiliser use will cease, and the grasslands will be managed to promote fine grasses and wildflowers (management will be through sheep grazing). This will result in an increase in species richness within the grassland fields which will be of benefit to a number of species such as invertebrates, birds and small mammals.

There are a number of seasonally wet, shallow drains located along hedgerows within the proposed Solar Park. Currently these are of limited ecological value, being either devoid of vegetation through heavy cattle poaching or inundated with vegetation, meaning that they are permanently dry. It is proposed that as part of the habitat management scheme for the proposed Solar Park that the drains are retained and maintained regularly. Cattle will be removed from the proposed Solar Park so the heavy poaching will stop and the habitats allowed to re-establish. Bare soils are likely to become rapidly colonised by wildflowers and marginals from adjacent damp habitats. However, in the event of slow natural regeneration the areas will be sown with a native damp wildflower mix and/or a shade tolerant hedgerow mix typical of the locality.

Through undertaking the habitat enhancements described above, the proposed Solar Park development will comply with PPW policies relating to ecosystem resilience and the requirements for proposed developments to provide a net benefit for biodiversity.

In order to safeguard badgers and small mammals such as hedgehogs/hares/polecats during the construction phase the following best practice measures will be followed:

- Any man-made excavations, trenches or pits relating to the development will either be securely fenced off or covered up overnight to avoid entrapment or, if left open, an egress point (e.g. mammal ladders or a roughened plank) will be placed within the excavation to form a ramp to allow mammals to escape;
- Any temporarily exposed open pipe system will be capped in such a way as to prevent badgers/small mammals gaining access as may happen when contractors are off site; and
- Any excavations will be inspected each morning to ensure no mammals have become trapped overnight. Contractors will be made aware that trapped animals such as badgers may dig a temporary sett into the side of a trench. If a badger is found within any excavations, an ecologist must be contacted immediately for further advice.

Deer fencing is to be erected around the perimeter of the fields to prevent damage to the solar panels. However, the fencing will include 'badger gaps' every 50m to ensure that badgers (and other small mammals such as hedgehog/hare/polecat) have continued access across the whole of the proposed Solar Park for foraging and commuting.

A Construction Environmental Management Plan (CEMP) will be produced prior to construction activities commencing on the proposed Solar Park to ensure that best practice methods are adhered

to in order to limit the generation of litter, dust, noise and vibration. This will be controlled and monitored through the CEMP. Measures will be implemented to avoid/minimise potential for problems such as fuel and other chemical spills. There will be no storage of potentially contaminating materials on the site. In addition, the following measures should be included in the CEMP:

- ensure that work compounds and access tracks etc. are not located in, or adjacent to, areas that maintain habitat value such as hedgerows;
- establish site fencing to prevent access to areas outside working areas, particularly in areas adjacent to features of interest/value;
- provide briefings and instruction to contractors regarding the biodiversity issues present on the site; and
- follow pollution prevention guidelines provided by Natural Resources Wales to prevent pollution of water courses from silt or chemicals.

## 6.8 Impact Assessment

### 6.8.1 Site Preparation, Construction and Decommissioning Impacts

#### Designated Sites

There are no statutory designated sites located within 2km of the proposed Solar Park. Therefore, it is not anticipated that there will be any impacts to statutory designated sites as a result of the proposed development.

Due to the distance between the proposed Solar Park site and the twenty-two non-statutory designated sites located within 2km of the proposed Solar Park, no direct impacts on these sites are anticipated.

The construction works associated with the development, including the creation of the access roads, the control building, inverter buildings and the lay down area, are small scale works and likely to be completed within a short time frame. There is low potential for Middle Llan SINC, which is located 30m south of the site to be subject to temporary indirect impacts such as dust and noise during the construction phase. However, as part of the in-built mitigation dust prevention guidelines will be followed to prevent any pollution incidents and ensure that dust is kept to a minimum and noise levels will only be increased temporarily. Therefore, the impact on Middle Llan SINC from dust and noise would be **negligible (adverse)** and a **non-significant negligible (adverse)** effect is anticipated.

It is not anticipated that the proposed Solar Park development will result in any other non-direct impacts to the other non-statutory designated sites located within 2km of the proposed site.

#### Habitats

The construction phase will result in a small-scale loss of pasture and neutral grassland habitat and the loss of c. 5.5m of species rich hedgerow; all other habitats including watercourses/drains, trees and hedgerows, will be retained within the proposed development. A tree survey completed in December 2019 across the site (Appendix I) has identified a number of trees which require low priority removal or structural works to maintain the health of the tree or to remove dead wood which may become unstable at a later date. These trees do not require removal to facilitate development and will not be removed prior to construction or operation of the proposed solar park. The methodology and pre-works ecology surveys required in relation to the future removal/pruning of these trees and any other trees found to require works during the lifetime of the proposed solar park will be set out in a subsequent Landscape and Ecological Management Plan (LEMP).

The loss of the 5.5m of hedgerow has been mitigated through in-built mitigation; an additional 38m of species rich hedgerow will be planted and retained hedgerows enhanced through the infilling of 75m of existing gaps with a species rich hedgerow mix.

The small-scale loss of grassland habitat will be mitigated for through the enhancement of the retained grassland habitats. Currently the grassland fields are fertilised to provide grazing for cattle and horses. It is proposed that once the fields come into use as part of the proposed Solar Park, fertiliser use will cease, and the grasslands will be managed to promote fine grasses and wildflowers (management will be through sheep grazing). This will result in an increase in species richness within the grassland fields which will be of benefit to a number of species such as invertebrates, birds and small mammals.

There are a number of seasonally wet, shallow drains located along hedgerows within the proposed site. Currently these are of limited ecological value, being either devoid of vegetation through heavy cattle poaching or inundated with vegetation, meaning that they are permanently dry. It is proposed that as part of the habitat management scheme for the proposed Solar Park that the drains are retained and maintained regularly. Cattle will be removed from the site so the heavy poaching will stop and the habitats allowed to re-establish. Bare soils are likely to become rapidly colonised by wildflowers and marginals from adjacent damp habitats. However, in the event of slow natural regeneration the areas will be sown with a damp wildflower mix and/or a shade tolerant hedgerow mix typical of the locality.

Therefore, the impact of the construction phase on habitats would be **low (beneficial)** and a **non-significant minor (beneficial)** effect is anticipated.

## Species

### Flora

No floral species of note will be lost as result of the proposed development. Royal fern has been identified within the tree bank located along the south western boundary of the southern central section of the site (TN14). However, no construction works are proposed within 5m of the tree bank and therefore the impact from construction/decommissioning on notable flora will be **no change** and the effect will also be **no change**.

### Amphibians

The habitat loss associated with the proposed Solar Park is not likely to result in any impact to local common amphibian populations. With the exception of c. 5.5m of hedgerow, all hedgerows, ditches and tree lines associated with the proposed site will be retained, with a minimum of 2m buffer. An additional 38m of new species rich hedgerow will be planted. The retained hedgerows within the site will be enhanced through the infilling of 75m of existing gaps with a species rich hedgerow mix; this will strengthen the continuity of the hedgerow and tree line network which will benefit commuting amphibians. The grassland habitats will for the most part remain intact and therefore could continue to be used as potential foraging habitat for amphibians.

In built mitigation means that construction works will adhere to best practice guidelines to prevent dust and pollution.

Traffic movements during construction and decommissioning will generally be during daylight hours; amphibians are usually more active at night so increased traffic is unlikely to impact common amphibian species.

Additional lighting will not be required on site as it should be possible to install the panels during daylight hours. Therefore there will be no subsequent impacts upon amphibians within the proposed Solar Park for any period of time.

Therefore, the impact of the construction/decommissioning phase on common amphibians would be **negligible (beneficial)** and a **non-significant negligible (beneficial)** effect is anticipated.

### Reptiles

The habitat loss associated with the proposed Solar Park is not likely to result in any impact to local reptile populations. With the exception of c. 5.5m of hedgerow, all hedgerows, ditches and tree lines associated with the proposed site will be retained, with a minimum of 2m buffer. An additional 38m of new species rich hedgerow will be planted. The hedgerows within the site will be enhanced through the infilling of 75m of existing gaps with a species rich hedgerow mix; this will strengthen the continuity of the hedgerow and tree line network which will benefit commuting reptiles. The grassland habitats will for the most part remain intact and therefore could continue to be used as potential foraging habitat for reptiles.

In built mitigation means that construction works will adhere to best practice guidelines to prevent dust and pollution.

Increased traffic during construction and decommissioning will be temporary and is considered unlikely to impact reptiles.

Additional lighting will not be required on site as it should be possible to install the panels during daylight hours. Therefore there will be no subsequent impacts upon reptiles within the site for any period of time.

Therefore, the impact of the construction/decommissioning phase on reptiles would be **negligible (beneficial)** and a **non-significant negligible (beneficial)** effect is anticipated.

## Birds

It is anticipated that the majority of the suitable breeding bird habitat will be retained within the proposed development. The loss of 5.5m of hedgerow to create the new access will be mitigated for through the planting of 38m of new species rich hedgerow and the in-filling of 75m of existing gaps within the retained hedgerow system. The removal of the 5.5m of hedgerow will be undertaken outside of the breeding bird season, which runs from March to August inclusively. If it is not possible to undertake the clearance outside the breeding bird season, then the work should be supervised by an experienced ecologist, acting as an Ecological Clerk of Works (ECoW).

The hedgerow section to be removed will be checked by the ECoW for field signs of nesting birds (or birds thought to be in the process of constructing a nest). If no signs of nesting birds are identified, then the hedgerow can be cleared systematically under the guidance of the ECoW. If any active nests (or nests in the process of construction) are identified, then a suitable stand-off should be affected from the active nest. Further visits to the site from the ECoW will be required to monitor the nest activity and give guidance and instruction as to when it will be safe to remove the vegetation around the nest site, i.e. when the young have fledged and flown the nest.

The semi-improved neutral grassland habitat has some potential to support ground nesting birds such as skylark. In order to ensure ground nesting birds are safeguarded during the installation of the solar panels these works should be undertaken outside of the breeding bird season. If this is not possible any areas of suitable ground nesting bird habitat will be mown outside of the breeding bird season to ensure it remains unsuitable for ground nesting birds whilst the solar panels are installed. The loss of ground nesting bird habitat will be temporary and once the panels have been installed the grasslands will be managed for biodiversity with rotational sheep grazing.

In built mitigation means that construction works will adhere to best practice guidelines to prevent dust and pollution.

Increased traffic and noise during construction and decommissioning will be temporary and is considered unlikely to be sufficient to alter the behaviour of birds within the proposed site for any period of time.

Additional lighting will not be required on site as it should be possible to install the panels during daylight hours. Therefore there will be no subsequent impacts upon birds within the proposed site for any period of time.

Therefore, the impact of the construction/decommissioning phase on birds would be **negligible (beneficial)** and a **non-significant negligible (beneficial)** effect is anticipated.

## Bats

It is anticipated that the majority of the suitable bat habitat will be retained within the proposed development as the boundary tree lines (some of which have features with the potential to support roosting bats), hedgerows and ditches will be retained along with a minimum of 2m stand-off and up to 5m where no access track is proposed. The exception is the loss of 5.5m of hedgerow which is required to create the new access. This will be mitigated for through the planting of 38m of new species rich hedgerow and the in-filling of 75m existing gaps within the retained hedgerow system.

As detailed above, a tree survey completed in December 2019 identified a number of trees which require low priority removal or structural works to maintain the health of the tree or to remove dead wood which may become unstable at a later date. These trees do not require removal to facilitate development and will not be removed prior to construction or operation of the proposed solar park and will be left in situ so that they continue to provide potentially suitable habitat for bats for as long as possible. The ongoing maintenance and management of the trees on site will be set out in a subsequent Landscape and Ecological Management Plan (LEMP). The trees on site will be inspected regularly to ensure their condition remains compatible with the proposed Solar Park development. If trees require remedial works or removal, then they will first be assessed by a licenced bat ecologist to determine if they include features that have the potential to support roosting bats. Trees identified as having moderate or higher bat potential features will be inspected further using methods such as tree climbing and/or endoscope inspections.

In built mitigation means that construction works will adhere to best practice guidelines to prevent dust and pollution.

Increased traffic and noise during construction and decommissioning will be temporary and is considered unlikely to be sufficient to alter the behaviour of bats within the proposed site for any period of time.

Additional lighting will not be required on site as it should be possible to install the panels during daylight hours. Therefore there will be no subsequent impacts upon bats within the proposed site for any period of time.

Therefore, the impact of the construction/decommissioning phase on bats would be **negligible (beneficial)** and a **non-significant negligible (beneficial)** effect is anticipated.

## Dormouse

With the exception of c. 5.5m of hedgerow, all hedgerows, ditches and tree lines associated with the proposed site will be retained, with a minimum of a 2m stand-off. The section of hedgerow to be lost is located adjacent to an existing gateway (gap). Dormice are sensitive to gaps and therefore the section of hedgerow to be removed is considered to be sub-optimal for the species and it is considered very unlikely that a dormouse would be encountered on site during the hedgerow removal.

The loss of the short section of species rich hedgerow will be mitigated for through the planting of an additional 38m of new species rich hedgerow. Additionally, the retained hedgerows will be enhanced through the infilling of existing gaps with a species rich hedgerow mix; this will strengthen the continuity of the hedgerow and tree line network which will benefit commuting dormouse.

In built mitigation means that construction works will adhere to best practice guidelines to prevent dust and pollution.

Increased traffic and noise during construction and decommissioning will be temporary and is considered unlikely to impact commuting dormouse.

Additional lighting will not be required on site as it should be possible to install the panels during daylight hours. Therefore there will be no subsequent impacts upon commuting dormouse within the site for any period of time.

Therefore, the impact of the construction/decommissioning phase on commuting dormouse would be **negligible (beneficial)** and a **non-significant negligible (beneficial)** effect is anticipated.

### 6.8.2 Operational Impacts

Given the in-built mitigation ensuring that the perimeter deer fencing does not result in habitat fragmentation by ensuring mammals and other species still able to access the full site during the operational phase, there are not anticipated to be any impacts arising from the operational phase of the proposed development.

Table 6-7 below summarises the potential impacts during both construction and operation, and their significance for all VERs associated with the proposed development.

**Table 6-7: Summary Impacts**

| VER              | Value  | Phase        | Type of Impact                      | Magnitude and extent of impacts | Confidence, duration and reversibility | Significance of impact |
|------------------|--------|--------------|-------------------------------------|---------------------------------|----------------------------------------|------------------------|
| Middle Llan SINC | County | Construction | Disturbance                         | Negligible (adverse)            | Potentially Temporary Reversible       | Not significant        |
|                  |        |              | Pollution                           | Negligible (adverse)            | Unlikely Temporary Reversible          | Not significant        |
| Site Habitats    | Local  | Construction | Habitat loss/ creation/ enhancement | Low (beneficial)                | Certain Long term Reversible           | Not significant        |
|                  |        |              | Disturbance                         | Negligible (adverse)            | Potentially Temporary Reversible       | Not significant        |
|                  |        |              | Pollution                           | Negligible (adverse)            | Unlikely Temporary Reversible          | Not significant        |
| Flora            | Local  | Construction | Habitat loss/ creation/ enhancement | No Change                       | Certain permanent Not reversible       | Not significant        |
|                  |        |              | Pollution                           | Negligible (adverse)            | Unlikely Temporary Reversible          | Not significant        |
| Amphibians       | Local  | Construction | Habitat loss/ creation/ enhancement | Negligible (beneficial)         | Certain permanent Not reversible       | Not significant        |
|                  |        |              | Disturbance                         | Negligible (adverse)            | Potentially Temporary Reversible       | Not significant        |
|                  |        |              | Pollution                           | Negligible (adverse)            | Unlikely Temporary Reversible          | Not significant        |

|          |       |              |                                           |                            |                                        |                 |
|----------|-------|--------------|-------------------------------------------|----------------------------|----------------------------------------|-----------------|
| Reptiles | Local | Construction | Habitat loss/<br>creation/<br>enhancement | Negligible<br>(beneficial) | Certain<br>permanent<br>Not reversible | Not significant |
|          |       |              | Disturbance                               | Negligible<br>(adverse)    | Potentially<br>Temporary<br>Reversible | Not significant |
|          |       |              | Pollution                                 | Negligible<br>(adverse)    | Unlikely<br>Temporary<br>Reversible    | Not significant |
| Birds    | Local | Construction | Habitat loss/<br>creation/<br>enhancement | Negligible<br>(beneficial) | Certain<br>permanent<br>Not reversible | Not significant |
|          |       |              | Disturbance                               | Negligible<br>(adverse)    | Potentially<br>Temporary<br>Reversible | Not significant |
|          |       |              | Pollution                                 | Negligible<br>(adverse)    | Unlikely<br>Temporary<br>Reversible    | Not significant |
| Bats     | Local | Construction | Habitat loss/<br>creation/<br>enhancement | Negligible<br>(beneficial) | Certain<br>permanent<br>Not reversible | Not significant |
|          |       |              | Disturbance                               | Negligible<br>(adverse)    | Potentially<br>Temporary<br>Reversible | Not significant |
|          |       |              | Pollution                                 | Negligible<br>(adverse)    | Unlikely<br>Temporary<br>Reversible    | Not significant |
| Dormouse | Local | Construction | Habitat loss/<br>creation/<br>enhancement | Negligible<br>(beneficial) | Certain<br>permanent<br>Not reversible | Not significant |
|          |       |              | Disturbance                               | Negligible<br>(adverse)    | Potentially<br>Temporary<br>Reversible | Not significant |

|  |  |  |           |                         |                                     |                 |
|--|--|--|-----------|-------------------------|-------------------------------------|-----------------|
|  |  |  | Pollution | Negligible<br>(adverse) | Unlikely<br>Temporary<br>Reversible | Not significant |
|--|--|--|-----------|-------------------------|-------------------------------------|-----------------|

## 6.9 Assessment of residual effects

There are no significant residual effects anticipated as a result of the proposed solar farm development.

## 6.10 Summary of Mitigation, Compensation and Enhancement Measures

### 6.10.1 Mitigation

Mitigation measures are those that avoid/reduce potential impacts. For the proposed Solar Park site the following mitigation measures are included:

- Retain and safeguard all but 5.5m of hedgerow habitat within the site, with a minimum 2m stand-off from works;
- Retain and safeguard all trees on site;
- Retain and safeguard all ditches and watercourses;
- Undertake a pre-construction badger survey across the proposed site;
- Ensure there is no habitat fragmentation by installing 'badger gaps' at the base of the perimeter deer fencing. These gaps can be used by badgers and other species to maintain full access across the site post development;
- Safeguard badgers and small mammals such as hedgehogs/hares/polecats during the construction phase by ensuring excavations are fenced/covered overnight (or an egress point such as a ramp is provided). Excavations will be inspected each morning to ensure no animals have become trapped; and
- Prepare a Construction Environmental Management Plan (CEMP) to ensure that best practice methods are adhered to in order to limit the generation of litter, dust, noise, vibration and pollution prevention. The CEMP will also include details of briefings and instruction to contractors regarding the biodiversity present on the site as appropriate.

### 6.10.2 Compensation

Compensation measures are those that have been incorporated to off-set potential impacts. For the proposed Solar Park site the following compensation measures are included:

- 38m of new species rich, native hedgerow planting will be undertaken to off-set the loss of 5.5m of existing hedgerow as a result of the development; and
- Where the 5.5m of hedgerow is removed the retained ends of the hedgebank will be repaired and planted by local craftsmen to maintain the local character of the proposed Solar Park site.

### 6.10.3 Enhancement

Enhancement measures are those that have been incorporated into the scheme to ensure the final development delivers a net gain for biodiversity in accordance with local and national planning policy. For the proposed Solar Park site the following enhancement measures are included:

- All existing gaps within the retained hedgerows will be planted up with a species rich, native mix. This will strengthen the connectivity and continuity of the hedgerow network and increase

- their value as commuting and foraging routes;
- The addition of fertiliser to the grassland fields will cease once the fields come into use as part of the proposed solar farm, as will grazing by cattle and horses. Instead the grasslands will be managed to promote fine grasses and wildflowers (management will be through rotational sheep grazing). This will result in an increase in species richness within the grassland fields which will be of benefit to a number of species such as invertebrates, birds and small mammals; and
- The seasonally wet drains located within the proposed development site will be retained within the proposed Solar Park development. The drains are currently of limited ecological value, being either devoid of vegetation through heavy cattle poaching or inundated with vegetation, meaning that they are permanently dry. It is proposed that as part of the habitat management scheme that the drains are maintained regularly. Cattle will be removed from the proposed Solar Park so the heavy poaching will cease and the habitats allowed to re-establish. Bare soils are likely to become rapidly colonised by wildflowers and marginals from adjacent damp habitats. However, in the event of slow natural regeneration the areas will be sown with a native damp wildflower mix and/or a shade tolerant hedgerow mix typical of the locality.

## 6.11 Conclusion

No significant effects are anticipated for designated sites, habitats or species as a result of the proposed Solar Park. The habitat creation/enhancement measures and changes to habitat management as a result of the proposed development are likely to see a net gain in biodiversity as a result of the proposed development; this is consistent with local and national planning policies relating to nature conservation

## 7 Cultural Heritage

### 7.1 Summary

An archaeological Desk Based Assessment (DBA) for the project utilising cartographic, documentary and photographic sources and a site walkover has been undertaken by Orion Heritage Ltd. The results of the DBA show that there is likely to be archaeological remains beneath the site. A geophysical survey of the site has been completed so that any archaeological remains can be located and avoided during construction. The geophysical survey detected possible archaeological activity in the east of the survey area, consisting of a group of linear features likely related to a post-Medieval farmstead. Minimal works are proposed in this area and therefore no potentially significant impacts are anticipated.

With regard to cultural heritage designations there are no World Heritage Sites, Ancient Battlefields or Registered Parks and Gardens within 5 km of the proposed development.

There are no listed buildings within 2km of the site. There are 7 listed buildings within a wider 5km study area, 6 of which are Grade II\* listed and 1 of which is Grade I listed.

Field and desk based analysis has shown that there are no SAMs within 2km of the site. There are 12 within a wider 5km study area. Potential impacts upon listed buildings and this SAM will be mitigated by the natural topography and screening of the surrounding landscape and as such are predicted to be within acceptable levels.

There are no conservation areas within 2 km of the site boundary.

Overall, the development of the Solar Park is not predicted to impact significantly upon the cultural heritage of the site or surrounding area.

### 7.2 Introduction

This section of the ER provides an assessment of the existing archaeological and designated heritage assets at the site and in the surrounding area and the potential impact that the development may have on these resources. A designated heritage asset is a World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area. In Wales, areas of landscape have been designated and included in the non-statutory Register of Landscapes of Historic Interest in Wales.

The objectives of this assessment are to:

- Describe the survival and extent of known or potential cultural heritage resources which may be impacted by the proposed development;
- Provide an assessment of the importance of these assets;
- Assess the likely scale of any impacts on the archaeological and cultural heritage resource posed by the development;
- Outline suitable mitigation measures to avoid, reduce or remedy significant adverse effects; and
- Provide an assessment of any residual effects remaining after mitigation.

This Cultural Heritage section has been completed with detailed reference to a Desk Based Assessment (DBA) and Settings Impact Assessment (SIA) undertaken by Orion Heritage Ltd, and the

Geophysical Survey Report prepared by Magnitude Surveys. These reports are all provided in Appendix D.

## 7.3 Legislation and Guidance

In compiling this section due reference has been made to the legislation and guidance detailed within the various reports provided in Appendix D.

## 7.4 Assessment Methodology

### 7.4.1 Buried Archaeology

The potential impacts upon archaeological remains of local, regional, national or international importance have been assessed across the site. Due to the nature of the development it is not considered that the proposed Solar Park will impact upon potential archaeological remains off site. Nevertheless as part of the archaeological desk based assessment, recorded remains within 1 km of the site were also identified. This study area was selected for assessment as this is deemed to provide an adequate indication of the density of archaeological sites in the vicinity of the site which in turn informs whether there are likely to be any remains within the site itself. Due to the identification of the potential for archaeological remains to be present beneath the site a site-wide geophysical survey was completed.

### 7.4.2 Cultural Heritage

The potential impacts upon designated heritage assets of local, regional, national or international importance such as upstanding heritage sites have been assessed within 2 km of the site. This study area has been chosen for assessment as it is deemed to be representative of the landscape setting in which the Solar Park will be constructed. Additionally, upstanding heritage remains further than 1 km from the site are less likely to experience views of the Solar Park because of the natural topography of the landscape.

## 7.5 Baseline Studies and Surveys

### 7.5.1 Desk-Based Assessment

A DBA utilising cartographic, documentary and photographic sources and a site walkover has been undertaken. The DBA has been produced in line with current guidance and is provided in Appendix Appendix D.1 of this report.

### 7.5.2 Geophysical Survey

Geophysical prospection comprised the magnetic method as described in the following table.

| Method          | Instrument                                                                 | Traverse Interval | Sample Interval                |
|-----------------|----------------------------------------------------------------------------|-------------------|--------------------------------|
| <b>Magnetic</b> | Bartington<br><br>Instruments Grad-13<br>Digital Three-Axis<br>Gradiometer | 1m                | 200Hz reprojected to<br>0.125m |

The magnetic data were collected using MS' bespoke hand-pulled cart system and hand-carried GNSS-positioned system.

MS' cart and hand-carried system was comprised of Bartington Instruments . Grad 13 Digital Three-Axis Gradiometers. Positional referencing was through a multi-channel, multi-constellation GNSS Smart Antenna RTK GPS outputting in NMEA mode to ensure high positional accuracy of collected measurements. The RTK GPS is accurate to 0.008m + 1ppm in the horizontal and 0.015m + 1ppm in the vertical.

The surveys and reporting were conducted in accordance with storic England's standards for "raw or minimally processed data" (see sect 4.2 in David et al., 2008: 11). The geophysical survey results are provided in Appendix D.2 of this report.

The geophysical survey concluded that there were areas where potential archaeological remains may be present beneath the site. The DBA concludes that:

*'On this basis, that any potential archaeology within the study site is expected to be of low significance and that the impact of the proposed development will be limited, it is considered that there are no potential archaeological constraints to development of the study site. Should the Local Planning Authority require any further archaeological mitigation measures these could follow planning consent and be secured by an archaeological planning condition.'*

### **7.5.3 Baseline Conditions**

#### **7.5.3.1 Archaeological Resource Summary**

A review of the available baseline evidence shows that the study site has a low potential to contain remains from all early periods; occupying, as it does, a rural position outside historic settlement. There is a high potential for Post-Medieval/Modern archaeology to be present within the study site. A small building is depicted in some early OS mapping at the north east corner of the study site, fronting on to Rhyd-y-pandy road and named as 'Penyedw'. Geophysical survey of the study site conducted as part of this assessment has confirmed linear features in this area and traces of this building may be identifiable archaeologically. Extensive drainage features and areas of 'made ground' were also detected, suggesting intense and prolonged landscape management of the site. However any archaeological evidence recovered, if present, is likely to be of limited significance and the available evidence suggests that the majority of the study site remained undeveloped.

Further details of the above baseline conditions are provided within the DBA (Appendix D.1).

#### **7.5.3.2 HER / SMR Entries**

A total of 12 Historic Environment Records were identified within 1km study area of the site. The locations of these are shown in the DBA in Appendix D.1.

#### **7.5.3.3 Nationally Important Monuments and Registered Parks and Gardens**

There are understood to be no World Heritage Sites, Registered Parks and Gardens or Ancient Battlefields within 5 km of the site.

#### **7.5.3.4 Listed Buildings**

There are no listed buildings within 2km of the site. There are 7 listed buildings within a wider 5km study area, 6 of which are Grade II\* listed and 1 of which is Grade I listed.

The listing of Grade II buildings ensures that the architectural and historical interest of the building is carefully considered before any alterations are made to the building. In addition buildings are most commonly listed for age, rarity, architectural merit or method of construction as opposed to their

historical landscape setting. Grade I listed buildings may be designated for their landscape setting as well as their age, rarity, architectural merit or method of construction.

#### **7.5.3.5 Conservation Areas**

There are no conservation areas within 2 km of the site boundary.

### **7.6 Potential impacts during construction**

The objective of this assessment is to define the potential direct and indirect impacts of the Solar Park development on the designated heritage assets that could be affected by the development. The nature of the site and the surrounding topography and vegetations is such that impacts will be limited to the first few kilometres.

Direct impacts to listed buildings and scheduled monuments are defined as damage, destruction or significant alteration of the building, whereas indirect effects may result from noise, vibration or visual impacts.

Developments also have the potential to visually impact the setting of a listed building. Impacts on setting may result from changes in the ability to appreciate buildings within the historic landscape in which they were designed to be part. For example important castles or military buildings may occupy elevated positions to aid clear uninterrupted views across the landscape. In a case such as this, the overall setting of the building is important to preserve and appreciate its historical significance.

#### **7.6.1 Buried Archaeology**

As stated within the DBA, the impact of the proposed development on the study site is very limited, comprising a total below ground impact of less than 1% of the study site area. The piles used result in localised impacts, no large-scale ground reduction or landscaping is planned. Furthermore, some impacts such as for cable trenches and access roads, can also impact buried remains.

The results of the geophysical survey indicate that the proposed works will not impact upon buried archaeology across much of the site. Some potential archaeological activity was detected to the east of the survey area, consisting of a group of linear features likely related to a post-Medieval farmstead. This area will be largely avoided by the proposed layout of the solar park and therefore the proposed development will not impact upon these potential remains.

Taking the above into consideration, while the development proposals have the potential to impact on any sub-surface remains which may survive within the study site, this impact is considered to be minimal and not significant.

#### **7.6.2 Listed Buildings and Conservation Areas**

None of the listed buildings identified within the study area are within the site boundary. There will therefore be no direct impacts on the listed buildings in terms of destruction or physical alteration.

Due to the distance of the listed buildings from the proposed development and the proposed construction methods, it is considered that there will be no indirect impacts upon the buildings as a result of noise or vibration during construction.

#### **7.6.3 Cultural Heritage Assets**

Any potential impacts upon designated heritage assets including SAMs and listed buildings during construction will be visual and temporary in nature. For this reason no significant impacts on these assets are anticipated during the construction and decommissioning period.

## **7.7 Potential Impacts during operation**

The objective of this assessment is to define the potential direct and indirect impacts of the Solar Park development on the designated heritage assets that could be affected by the development. The nature of the site and the surrounding topography and vegetations is such that impacts will be limited to the first few kilometres.

Direct impacts to listed buildings and scheduled monuments are defined as damage, destruction or significant alteration of the building, whereas indirect effects may result from noise, vibration or visual impacts.

Developments also have the potential to visually impact the setting of a listed building. Impacts on setting may result from changes in the ability to appreciate buildings within the historic landscape in which they were designed to be part. For example important castles or military buildings may occupy elevated positions to aid clear uninterrupted views across the landscape. In a case such as this, the overall setting of the building is important to preserve and appreciate its historical significance.

### **7.7.1 Nationally important monuments and Registered Parks and Gardens**

There are no World Heritage Sites, Ancient Battlefields or Registered Parks and Gardens within 5 km of the proposed development. Taking into consideration the nature of the proposed development and the surrounding topography and vegetation, any such sites are considered therefore to be outside of the potential impact zone of the proposed Solar Park. The proposed Solar Park will therefore have no significant impacts on Nationally Important Monuments or Registered Parks and Gardens.

There are no Scheduled Ancient Monuments (SAMs) on site or within 1km of the site and so the proposed construction works are not anticipated to have significant direct impacts or indirect impacts from noise and vibration on any scheduled ancient monuments.

The SIA concludes that there will be no significant visual impacts as a result of the proposed development.

### **7.7.2 Listed Buildings and Conservation Areas**

None of the listed buildings identified within the study area are within the site boundary. There will therefore be no direct impacts on the listed buildings in terms of destruction or physical alteration.

Due to the distance of the listed buildings from the proposed development, it is considered that there will be no indirect impacts upon the buildings as a result of noise or vibration during operation.

Of the listed buildings assessed within the SIA, due to the existing topography and screening by trees, hedgerows and buildings, no significant visual impacts on these buildings are anticipated.

Taking the above into consideration the proposed Solar Park is not anticipated to result in any significant impacts upon listed buildings.

There are no conservation areas within 2km of the site, for this reason no significant impacts on conservation areas are anticipated.

## **7.8 Potential impacts during decommissioning**

Decommissioning of the proposed Solar Park is considered to have similar impacts to those during construction. As such any decommissioning works will not result in any significant impacts on sub surface archaeology or cultural heritage assets.

## 7.9 Mitigation

The DBA and SIA do not identify any potentially significant impacts on buried archaeology or designated heritage assets and therefore no mitigation measures are proposed.

## 7.10 Conclusions

There are not anticipated to be any significant impacts on the archaeological or designated heritage assets of the site or surrounding area during construction, operation or decommissioning of the Solar Park.

While the development proposals have the potential to impact on any sub-surface remains which may survive within the study site, this impact is considered to be minimal and not significant.

There will be no direct impacts on any listed buildings or SAMs as no such features exist within the site boundary. Similarly there will be no significant indirect impacts on the listed buildings or SAMs, as existing topography, vegetation and buildings screen views of the proposed development from their location.

No mitigation measures are considered necessary.

## 8 Noise

This Section includes discussion of potential noise impacts during the construction and operational phases of the development. It should be noted that operational impacts of the development will be negligible due to the nature of PV technology and for that reason the bulk of the discussion relates to the impact associated with construction of the proposed Solar Park.

### 8.1 Methodology

The project can be broken down in to three distinct phases, namely, construction, operation and decommissioning. The nature of the works during these phases is summarised in Section 4 as is their respective duration.

PV projects are inherently quiet and as such no background noise monitoring or modelling has been undertaken for the project. Construction impacts have, however been addressed through the calculation of worst case noise levels arising from various pieces of construction equipment at the nearest residential property.

### 8.2 Legislative framework

There are a number of documents that are available to assist developers in determining the impacts of the projects with regard to noise. Those considered to be relevant to the proposed development include:

- BS 4142:1997 'Method for rating industrial noise affecting mixed residential and industrial areas,' BSI. BS 4142 offers guidance on the assessment of industrial and commercial noise affecting residential and industrial areas. It describes a method for assessing whether industrial noise is likely to result in complaints from nearby residents;
- BS 5228: 2009 'Noise and vibration control on construction and open sites' Parts 1 to 4, BSI. BS 5228 sites' gives recommendations for basic methods of noise and vibration control relating to construction sites and other open sites where construction activities are carried out. It offers a methodology for predicting noise levels from construction sites; and
- BS 7445: 1991/2003 'Description and Measurement of Environmental Noise' Parts 1 to 3, BSI. These documents defines and prescribes best practice during recording and reporting of environmental noise. It is inherently applied in all instances when making environmental noise measurements.

### 8.3 Noise sensitive receptors and Baseline Conditions

There are few residential properties in the vicinity of the proposed Solar Park. Those closest to the site include:

- Felin-Wen-Court, approximately 60m south east of the site at the nearest point;
- Cefn Betingau Farm, approximately 100m north of the site;
- Pen-Y-fedw, approximately 250 m to the north east of the site;
- Maes-eglwys Farm, approximately 330m south west of the site; and
- Llyn-Y-Fan approximately 500m to the north of the site.

Noise sources in the area include the M4 about 1.2 km to the south. Otherwise the area is generally quiet and typical of the open countryside.

No background noise measurements have been undertaken for the purposes of the noise assessment as noise emissions from the site in all phases are predicted to be such that they will not be able to give rise to significant impacts. This is demonstrated by the impact discussion in the sections below.

## 8.4 Predicted Impacts during Construction

Construction activity, whilst temporary in nature, inevitably leads to some degree of noise disturbance at nearby sensitive receptors. The noise levels generated by construction activities for the proposed Solar Park would have the potential therefore to impact upon nearby noise sensitive receptors.

Noise levels at any one location will vary with different combinations of plant machinery being used at any one time. These combinations change throughout the construction phase and would depend upon a number of variables, the most significant of which include the following:

- The noise generated by plant or equipment used on site, generally expressed as sound power levels;
- The periods of time construction plant is operational;
- The distance between the noise source and the receptor; and
- The level of attenuation likely due to ground absorption, air absorption and barrier effects.

Using BS 5228: 1997 'Noise and vibration control on construction and open sites' it is possible to make construction noise predictions for any sensitive receptors. Construction noise levels are predicted as a 'free field' equivalent continuous noise level averaged over a one-hour period (LAeq,1h), and then subsequently averaged over a 12-hour working day to give the LAeq,12h.

In the absence of specific information regarding the proposed construction plant and activities, it is possible to assess the potential construction noise impacts using the methodology set out in BS 5228 in conjunction with general information regarding proposed activities.

Department of the Environment (DoE) Advisory Leaflet 72 provides advice as to maximum levels of construction site noise at residential locations during daytime hours. The leaflet states that the noise level outside the nearest occupied room should not exceed 70 dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise. This increases to 75 dB(A) for urban areas near to main roads. Given the rural location of the proposed development the 70 dB(A) level applies for the purposes of this assessment.

In 2005, the Department for Environment, Food and Rural Affairs (DEFRA) published an Update of Noise Levels for the Prediction of Noise on Construction and Open Sites. This has been used to supplement the database contained in BS 5228.

Table 8.1 shows the noise levels associated with typical construction activities and gives an indication of the distance at which the 70 dB(A) limit proposed by the DoE would be met.

**Table 8.1: Construction Activities and Associated Noise Levels**

| Construction Activity/<br>Associated Plant | Typical<br>A-weighted<br>Sound<br>Pressure<br>Level (L <sub>A</sub> )<br>at 10 m | Example<br>Distance<br>Required<br>to meet 70<br>dB(A)<br>Limit (m) |
|--------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <b>Site Preparation</b>                    |                                                                                  |                                                                     |
| Dozer                                      | 75                                                                               | 18                                                                  |
| Tracked Excavator                          | 78                                                                               | 25                                                                  |
| Wheeled Backhoe Loader                     | 68                                                                               | 0                                                                   |
| <b>Excavation</b>                          |                                                                                  |                                                                     |
| Dozer                                      | 81                                                                               | 35                                                                  |
| Tracked Excavator                          | 79                                                                               | 28                                                                  |
| Loading Lorry                              | 80                                                                               | 32                                                                  |
| Articulated Dump Truck                     | 81                                                                               | 35                                                                  |
| <b>Rolling and Compaction</b>              |                                                                                  |                                                                     |
| Roller                                     | 79                                                                               | 28                                                                  |
| Vibratory Plate                            | 80                                                                               | 32                                                                  |
| <b>Piling</b>                              |                                                                                  |                                                                     |
| Hydraulic Hammer Rig                       | 89                                                                               | 90                                                                  |
| Large Rotary Bored Piling Rig              | 83                                                                               | 45                                                                  |
| <b>Welding/Cutting Steel</b>               |                                                                                  |                                                                     |
| Welder (Welding Piles)                     | 73                                                                               | 15                                                                  |
| Generator for welder                       | 57                                                                               | 0                                                                   |
| Cutter (Cutting Piles)                     | 68                                                                               | 0                                                                   |
| <b>Other</b>                               |                                                                                  |                                                                     |
| Large Lorry Concrete Mixer                 | 77                                                                               | 22                                                                  |
| Concrete Pump (Discharging)                | 67                                                                               | 0                                                                   |
| Tower Crane                                | 77                                                                               | 22                                                                  |

The estimated sound pressure levels shown are worst-case estimates based on propagation attenuation only and do not consider any screening, directivity or absorptive effects.

While it is not possible to predict an overall construction noise level at the noise sensitive receptor locations without detailed information regarding planned construction activity and plant, Table 8.1 indicates in this case the distances involved between the site and the majority of potentially sensitive receptors is large enough that the DoE level of 70 dB(A) will be met. The only residential receptor identified within 90m of the site boundary is Felin Wen Court. This property is located 60m from the site at the nearest point and is therefore beyond the distance for most construction activities set out in the table above, with only piling potentially requiring a larger offset distance. Only the most south easterly part of the site (approximately 1 acre) falls within the 90m target distance from this property. Works in this area will take place over a very limited period of time during daytime hours only and therefore no significant noise impacts are predicted.

Considering the temporary and changing nature of the proposed construction works, the current noise environment, and the distances between the proposed construction activities and noise sensitive receptor locations, the impact of construction noise is not predicted to be significant.

Wessex Solar Energy will require its construction contractors to minimise the impact of construction activities through successful implementation of an agreed Construction Environmental Management Plan (CEMP).

## **8.5 Predicted Impacts during Operation**

PV developments are inherently quiet. Noise emissions from PV plant are limited to noise associated with the inverters and transformers. No significant noise impacts are expected due to separation distances of this equipment from the limited number of properties that could be affected and inherent mitigation associated with the equipment and the structures in which they are housed.

## **8.6 Mitigation Measures and Monitoring Programmes**

### **8.6.1 Construction**

In order to keep noise impacts from the construction phase to a minimum, all construction activities would be carried out in accordance with the recommendations of BS 5228. In addition, the following mitigation measures would be implemented through the CEMP:

1. Core site working hours would be agreed with the Local Authority, and are specific to the construction site. These are generally Monday to Friday 08:00 – 18:00 hours and Saturday 08:00 – 13:00 hours. It may be necessary to work outside these core hours for certain activities but this would be with the prior agreement of the local authority if required.
2. All vehicles and mechanical plant used for construction would be fitted with effective exhaust silencers, and regularly maintained.
3. Inherently quiet plant would be used where appropriate, e.g. pneumatic percussive tools (should these be required) would be fitted with mufflers or silencers of the type recommended by the manufacturers.
4. All ancillary plant such as generators and pumps would be positioned so as to cause minimum noise disturbance.

### **8.6.2 Operation**

Given that the development will not give rise to any significant noise emissions it is not considered that any additional mitigating measures are required other than good project design. In the unlikely event that complaints are received during the operational phase the complaint will be investigated and if it is found that the plant has developed a fault remedial action to correct the problem will be undertaken.

## **8.7 Conclusion**

The impact of construction noise is not predicted to be significant due to the distances between the proposed construction site and the noise sensitive receptors, and due to the temporary and changing nature of the noise source.

During operation noise sources are limited to the on-site transformers and inverters that will not give rise to significant noise impacts at any of the noise sensitive receptors identified.

## 9 Geology, Hydrology and Hydrogeology

### 9.1 Introduction

This section details the baseline geological, hydrological and hydrogeological conditions at the site and outlines the potential environmental impacts of the proposed development on these resources. It also details the status of the site in terms of ground and surface water contamination and the risks posed to human health. Where potentially significant impacts have been identified, mitigation measures have been proposed to reduce these impacts to an acceptable level.

Throughout this Section the term “the site” has been used. This refers to the redline outline boundary of the site shown in Figure 1.2 of this Environmental Report. However, the actual area of underlying land which will be impacted by the excavation of foundations for panels, access roads and the inverter and transformer buildings only forms a small proportion of the overall site.

The site centre is located at Ordnance Survey Grid Reference 265955, 201127 and comprises nine pasture fields, totalling 13.89 ha.

### 9.2 Legislation, Policy and Best Practice

Baseline conditions and the potential impact of the development have been assessed with reference to the Town and Country Planning Act (Environmental Impact Assessment) (England and Wales) Regulations 1999, the Environmental Protection Act (1990), the Contaminated Land (Wales) Regulations (2006), the Construction (Health, Safety and Welfare) Regulations (1996), British Standard BSI 6031 (1981) – ‘Code of Practice for Earthworks, and CLR 11 – Model Procedures for the Management of Contamination.

In addition, the policies of City and County of Swansea Council have been considered as appropriate (see discussion in Section 3).

### 9.3 Assessment Methodology

The assessment approach has been undertaken with a clear understanding of the following:

- Previous land uses – through a review of historical maps;
- Underlying ground conditions – through a review of British Geological Survey (BGS) maps;
- Existing physical baseline conditions;
- Development proposals;
- Sensitivity to change;
- Magnitude of change; and
- Potential to mitigate impacts resulting from the proposed development.

Tables 9.1 to 9.3 have been used to assess the attribute importance of receptors and the significance criteria against which the magnitude of potential impacts from the development may have on soils, geology, hydrogeology and human health where appropriate.

The baseline geological, hydrological and hydrogeological conditions of the proposed Solar Park have been assessed with reference to the following:

- BGS mapping.
- Envirocheck Report – which included the following:

- Groundwater Vulnerability Map;
  - Historical plans from 1877 to the present day;
  - Details of discharge and waste consents, contaminated land sites and areas of sensitive land use for the site and its immediate vicinity; and
  - Geological and mining hazards.
- NRW flood maps, via  
[https://maps.cyfoethnaturiolcymru.gov.uk/Html5Viewer/Index.html?configBase=https://maps.cyfoethnaturiolcymru.gov.uk/Geocortex/Essentials/REST/sites/Flood\\_Risk/viewers/Flood\\_Risk/virtualdirectory/Resources/Config/Default&layerTheme=0](https://maps.cyfoethnaturiolcymru.gov.uk/Html5Viewer/Index.html?configBase=https://maps.cyfoethnaturiolcymru.gov.uk/Geocortex/Essentials/REST/sites/Flood_Risk/viewers/Flood_Risk/virtualdirectory/Resources/Config/Default&layerTheme=0)

Tables 9.1 to 9.3 define the criteria against which the magnitude and significance of impacts has been defined on a variety of receptors of varying sensitivity

**Table 9.1: Defining Attribute Importance for Receptors**

| <i>Attribute Sensitivity</i> | <i>Attribute Type</i>                         |                                                  |                                    |                                                           |                                                |                                                              |
|------------------------------|-----------------------------------------------|--------------------------------------------------|------------------------------------|-----------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------|
|                              | <i>End users</i>                              | <i>Construction workers</i>                      | <i>Surrounding land uses</i>       | <i>Controlled waters</i>                                  | <i>Ecological Systems</i>                      | <i>Built Environment</i>                                     |
| <b>High</b>                  | Residential, allotments, play areas           | Extensive earthworks and demolition of buildings | Greenfield site / residential area | Major aquifer or surface water in close proximity to site | Nationally or internationally designated sites | Listed buildings of high historic value or other sensitivity |
| <b>Medium</b>                | Landscaping or public open space              | Limited earthworks                               | Open space, commercial area        | Minor aquifer                                             | Locally designated ecological sites            | Buildings, including services and foundations                |
| <b>Low/Negligible</b>        | 'Hard' end use (e.g. industrial, car parking) | Minimal ground disturbance                       | Industrial area                    | No surface water bodies or aquifers close to the site     | No sites of ecological importance close by.    | N/A                                                          |

**Table 9.2: Criteria for Assessing the Magnitude of Impacts**

| <i>Significance Criteria</i> |            | <i>Description</i>                                                                                                                                                                                                                                              |
|------------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Major Impact                 | Adverse    | A permanent or long term adverse impact on the integrity and value of an environmental attribute or receptor or exposure to acutely toxic contaminants. For example, harm to human health, designated habitats or pollution to controlled waters.               |
|                              | Beneficial | Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.                                                                                                                             |
| Moderate Impact              | Adverse    | An adverse impact on the integrity and/or value of an environmental attribute or receptor, but recovery is possible in the medium term and no permanent impacts are predicted.                                                                                  |
|                              | Beneficial | Benefit to, or addition of, key characteristics, features, or elements or improvement of attribute quality.                                                                                                                                                     |
| Minor Impact                 | Adverse    | An adverse impact on the value of an environmental attribute or receptor, but recovery is expected in the short-term and there would be no impact on its integrity. For example, temporary effects on receptors not designated under environmental legislation. |
|                              | Beneficial | Minor benefit to, or addition of key characteristics, features or elements; some beneficial impact on attribute or a reduction in the risk of a negative impact occurring.                                                                                      |
| Negligible impact            |            | No impact would be detectable, either positive or negative.                                                                                                                                                                                                     |

**Table 9.3: Defining Significance of Effect Categories**

|                                |                   | Magnitude of Impact |                   |              |                 |              |
|--------------------------------|-------------------|---------------------|-------------------|--------------|-----------------|--------------|
|                                |                   | <i>No Change</i>    | <i>Negligible</i> | <i>Minor</i> | <i>Moderate</i> | <i>Major</i> |
| <b>Importance of Attribute</b> | <b>High</b>       | Neutral             | Slight            | Moderate     | Large           | Large        |
|                                | <b>Medium</b>     | Neutral             | Slight            | Slight       | Moderate        | Large        |
|                                | <b>Low</b>        | Neutral             | Slight            | Slight       | Slight          | Moderate     |
|                                | <b>Negligible</b> | Neutral             | Neutral           | Neutral      | Slight          | Slight       |

## 9.4 Baseline Conditions

### 9.4.1 Site History

Further information on the site's history is detailed in Appendix D and in Section 7 of this report.

### 9.4.2 Geology and Soils

BGS mapping indicates that the geology beneath the eastern part of the site comprises "Swansea Member – Sandstone" and "Grovesend Formation – Mudstone, Siltstone and Sandstone" beneath the western part of the site. These are all sedimentary bedrocks formed approximately 307 – 309 million years ago in the Carboniferous Period when the local environment was dominated by rivers. These bedrocks were formed from rivers depositing sand and gravel detrital material in channels to form river terrace deposits, with fine silt and clay from overbank floods forming floodplain alluvium, and some bogs depositing peat.

BGS Mapping also indicates that the superficial geology beneath the proposed site comprises largely "Till – Devensian – Diamicton" (formed in ice age conditions) with "Alluvium – Clay, Silt, Sand and Gravel" (formed from a local environment dominated by rivers) present in the most southerly field.

Soils at the site have been described by Soilscape (1:25,000 scale map showing soil types in Britain – Cranfield University) as comprising largely freely draining slightly acid loamy with a small area of Loamy and clayey floodplain soils with naturally high groundwater located in the southern parts of the site. These soils are considered to be low-moderate fertility providing drainage is maintained.

### 9.4.3 Ground Stability

It is understood that the site has not previously been the subject of any landfill or mineral extraction. The site has very low potential for landslide ground stability hazards, low potential for collapsible ground stability hazards, and moderate potential for compressible ground stability hazards. Consultation with the Coal Authority has confirmed that the site falls within the defined Development High Risk Area. The records indicate that thick coal seams outcrop within the site that may have been historically worked at shallow depth. However the proposed Solar Park falls within the Coal Authority Exemption List: Part B – Nature of Development, Guidance for Local Planning Authorities Version 5 (2019). Accordingly, there is no requirement for a Coal Mining Risk Assessment in support of this planning application.

An intrusive ground investigation will be undertaken on site prior to any development works to fully characterise the underlying deposits and assess their suitability to supporting a range of foundations.

### 9.4.4 Landscape and Topography

The majority of the site is southwest facing. At its highest point in the north eastern field the site is 98m AOD and at its lowest point in the south western field is 78m AOD.

Views of the site are generally constrained by the topography of the area and the vegetation that surrounds the fields in which it is proposed that the Solar Park will be constructed.

### 9.4.5 Hydrogeology

The geology underlying the site is classed as a Secondary Aquifer Category A (formally referred to as minor aquifers). This vulnerability classification is given to fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. These formations do not produce large quantities of water for abstraction, but may be important for local supplies and in supplying base flow to rivers.

The soils overlying the site vary in their leaching potential from intermediate (Soils which can possibly transmit a wide range of pollutants) to low (Soils in which pollutants are unlikely to penetrate the soil layer because water movement is largely horizontal or they have large ability to attenuate diffuse pollutants. Lateral flow from these soils contributes to groundwater recharge elsewhere in the catchment).

There are two groundwater abstraction points near to the site. The first is located at Cefn Betingau farm located 100m to the north of the site. The second is located approximately 60m from the site at Felin Wen Court.

The site is not located with a groundwater source protection zone.

#### 9.4.6 Hydrology

The Afon Llan River flows approximately 30m to the south of the site. The Natural Resources Wales Development Advice Map shows that the site does not fall within the Development Advice Zones C1 or C2 (*Used to indicate that development can take place subject to application of justification test, including acceptability of consequences*). A very small part of the site falls within Zone B (*Used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further*). The detailed mapping indicates that the entire site falls outside of the 0.1% flood level and is therefore not at risk of flooding.

Despite the above, it is acknowledged that as the development site is over 1 hectare (ha) in area, any application for planning permissions must be accompanied by a Flood Consequence Assessment. This assessment is provided in Appendix F.

### 9.5 Impact Assessment

#### 9.5.1 Construction

##### 9.5.1.1 Human Health (Construction Workers)

Based on information available from historical maps, the Envirocheck Report and a site walkover, it is not considered that the site has the potential to pose any significant risk to site workers or members of the public with regard to historic on site contamination.

Workers on site will be required to comply with all relevant health and safety legislation and guidance such as the Health and Safety at Work Etc. Act 1974, the Control of Substances Hazardous to Health Regulations (COSHH) 1999, and the Personal Protective Equipment Regulations 2002 amongst others.

##### 9.5.1.2 Geology and Soils

The attribute importance of the underlying geology and soils at the site have both been assessed as negligible as they are not of high agricultural value.

No mining activities have been proposed for the site and the development of the site is not considered to represent a sterilisation of any mineral assets as all infrastructure proposed for installation will be removed after about 40 years operation. Additionally, although the outline site boundary is approximately 13.89 ha in size, the foundations for the PV panels and electrical buildings will only take up small, localised areas of the site.

The disturbance of underlying deposits will be limited to the first 1.5 m. Any impacts will therefore be limited. Impacts on near-surface soils would be within the construction footprint, laydown areas and access roads only. The potential location of peat will be confirmed via a geotechnical survey prior to construction and no peat will be extracted as part of the development proposals. Therefore, overall,

the construction of the PV panels will have negligible impact on the underlying geology and soils of the site. The significance of effect is deemed neutral.

#### **9.5.1.3 Water Use and Disposal and Hydrology**

Construction activities on any site may, if uncontrolled, cause changes to surface and water drainage due to:

- Runoff from stockpiles;
- Increased runoff from compacted soils caused by e.g. movement of heavy equipment;
- Removal of vegetated top soil;
- The introduction of foundations and cable trenches; and
- The provision of access tracks.

A small amount of water will be required each day for the general construction works and hygiene, which will likely be brought to site by bowser. This water will be required for road construction and also dust suppression/wheel-washing facilities.

Nearby surface water quality has the potential to be affected by increased sedimentation if proposed protective measures are not taken. Silt can cause lasting damage to surface water biology and can also build up to cause flooding.

The site comprises 7 fields and is likely drained by the ditches which cross the western most field and the River to the south. An ecological assessment of site and its surroundings has not found any notable species of interest. Based on this information, the attribute importance of watercourses has been assessed as medium, in line with Table 9.1. The potential impact on this resource has been assessed as minor adverse due to the limited extent of groundworks. Therefore, the overall significance of effect has been assessed as potentially slight adverse.

The groundwater beneath the site has been classified as a minor aquifer and therefore, in line with Table 9.1 it has been assessed as being of medium sensitivity. There is considered to be a potentially minor impact on groundwater at the site as earthworks are likely to be temporary and limited in extent. Therefore the overall significance of effect is considered slight adverse.

The construction of access tracks, PV panels and the electrical buildings will result in some interception of natural surface water drainage routes. Of these the PV panels cover the greatest area by far, however, the gaps between the panel sections will allow run off to the ground below, such that there will be a negligible impact on groundwater recharge and the volume of run-off flowing into the river draining the site to the south.

There is the potential for minor adverse impacts on the minor aquifer underlying the site which is mostly of low sensitivity. These potential impacts would result from the interruption to lateral drainage as a result of the installation of the foundations of the electrical buildings and the on-site cable trenches, although no significant issues in this regard are expected.

The Flood Consequence Assessment for the site provided in Appendix F concludes that the impact of the development on the runoff from the site will not be significant. It shows that the impermeable area introduced across the site is very small and a dedicated drainage network will allow the interception and infiltration of the flows from new areas of hardstanding, further reducing potential impacts upon the surrounding area.

#### **9.5.1.4 Oil Spills**

There is the potential for spills/leakage of oil associated with construction machinery and vehicles. Oil spills could potentially contaminate groundwater, surface water or soils, having a detrimental impact

on aquatic life, plants and human health. However, as the construction period is anticipated to be relatively short and no major works are expected, this is only considered to represent a potentially slight adverse impact. This potential impact can be easily mitigated against as discussed below.

### **9.5.2 Operation**

Approximately 400 litres of oil will be contained within the switchgear to be located on site within an electrical building. In the event of a leak of this oil this would be entirely contained within a bund beneath the transformer and could not escape the building.

The introduction of small amounts of hardstanding and the PV panels onto the site is not anticipated to have a large impact on the overall drainage regime at the site. The access tracks will be permeable and should not have any significant effects on drainage patterns at the site. Therefore, there is not considered to be a risk from flooding at the site or a risk of the development causing flooding to surrounding sites.

### **9.5.3 Decommissioning**

The impacts on surface and ground water quality during decommissioning will be temporary in nature and would be similar to those described above for construction.

The concrete foundations may be left in the ground after decommissioning of the site. It is common for concrete foundations to remain in the ground for many years following decommissioning of sites. The environmental impact of this is predicted to be negligible as the foundations will be constructed of an appropriate grade of concrete to resist attack from any soil and groundwater contamination. Access tracks may remain in situ following decommissioning, having enabled vegetation to grow through the geo-membrane throughout the life of the project.

Other than the remaining foundations and access tracks, the ground will be reinstated back to its original state with suitably clean topsoil and grass covering where appropriate.

## **9.6 Mitigation**

The construction of the proposed Solar Park has the potential to create several minor impacts relating to human health, and surface water / groundwater quality. The following mitigation measures will limit these potential impacts to insignificant levels or eradicated them completely.

### **9.6.1 Construction**

#### ***9.6.1.1 Human Health (Construction Workers)***

Appropriate PPE will be worn on site at all times during construction including gloves, high visibility clothing, protective boots, hard hat and appropriate eye protection. If deemed necessary dust masks will also be required to be worn. Any additional PPE requirements will be identified as part of the site investigation

Dust suppression measures will be put in place to minimise dust levels on the site and in the surrounding environment however there is not considered to be a great potential for dust creation to arise given the nature of the proposed works.

#### ***9.6.1.2 Geology and Soils***

Silt fencing will be the first item to be installed on site as detailed in Appendix F of the CEMP. Following their installation, and to limit further disturbance to existing ground cover, the site access tracks will then be constructed. Any vegetation, topsoil and subsoil will be removed to expose a suitable sub-grade. Any soils, sub-soils or aggregate suitable for reuse will be stockpiled on impermeable liners.

Speed restrictions will be imposed on site to minimise disturbance of bare surfaces and the amount of disturbed surfaces left exposed for significant time periods will be minimised. Stockpiles of loose, fine materials will be damped down or covered over if necessary, again to reduce erosion and the production of dust.

#### ***9.6.1.3 Water Use and Disposal and Hydrology***

The access roads will be constructed to manage drainage of surface water and a temporary wheel washing facility will be installed, if required, to prevent transfer of soil onto nearby public roads and discharging into highway drains.

Any surface water, perched waters or groundwater from dewatering operations will not be discharged to surface water or drains, without the appropriate consents from the local water or Sewage Company and/or NRW. The disposal of this effluent will be the responsibility of the contractor. If necessary this water will be taken off-site for disposal at a suitable facility.

Temporary drainage routes and silt fences, constructed of geotextile, will be constructed. Any pumping will be undertaken at such a rate using an appropriately sized pump in order to avoid disturbance or erosion of the land and nearby water courses. The location of dewatering pipework would be carefully positioned. The contractor will regularly inspect all dewatering pumps, pipe work and connections.

Cable trenches will be refilled and compacted to the same condition as the surrounding substrate in order to prevent creation of new sub-surface flow pathways and decrease the likelihood of ponded water in the excavations. Trenches will be back-filled promptly in order to minimise water ingress. Confirmed mitigation measures such as working to best practice guidance, de-watering of excavations, re-instatement of excavations with similarly graded materials to what has been excavated and lining of excavations with sand and geotextile membranes where necessary will also ensure that any impacts are limited.

#### ***9.6.1.4 Oil Spills***

If discharge of any water is required as part of the construction process, the contractor will provide a silt trap and/or oil interceptor at a location agreed with NRW to allow solids or immiscible liquids to settle/separate prior to discharge. The contractor will inspect, empty and maintain silt traps/interceptors. A registered waste carrier will remove from site all sludges or residues collected during cleaning operations, to a suitably licensed waste disposal facility.

The storage of fuel, equipment and construction materials will be designed so as to minimise the risk of soil contamination or water pollution for example through the use of bunds, drip trays and oil interceptors in accordance with NRW guidelines.

Storage of fuel would be limited and secure. Any temporary diesel storage tanks will be double skinned or contained within an impermeable bund, capable of holding 110 percent of the tank's contents.

Construction machinery will be checked regularly. Any maintenance required will occur over hardstanding or on a suitable impermeable ground cover. Refuelling will be limited to a designated area, on an impermeable surface, away from any drains or watercourses. Spill kits, absorbent pads and absorbent sands will be available on site at all times. Any spills will be cleaned up as soon as possible with any contaminated sands bagged up and disposed of correctly. Parking of staff vehicles will only be permitted in designated areas.

Any impacts will be minimised by restricting vehicle movements to specified routes and controlling the construction areas. In addition, a temporary site compound will be created for the parking of construction vehicles and equipment, staff vehicles, and the storage of materials.

### 9.6.2 Operation

Any foundations will be designed appropriately to the underlying ground conditions to make sure the panels have maximum stability.

The onsite switchgear would be equipped with sensors to automatically detect loss in fluid pressure and/or increases in temperature enabling the transformer to shut down automatically in the event of a fluid leak. Any oil leaks from the switchgear would be contained inside the electrical building and would be cleaned up as soon as possible.

Disposal of all waste materials, whether hazardous or not, will only be via appropriate and authorised routes.

### 9.6.3 Decommissioning

A decommissioning plan will be prepared and submitted to the local planning authority for approval 12 months prior to the commencement of decommissioning works. This will specify a number of mitigation measures representing best practice at that particular time.

At this stage it is anticipated that the decommissioning area will be delineated and measures taken to avoid vehicle use outside the working boundary. In order to further limit disturbance, the site access tracks will be taken out last unless they are to be retained for future use.

Dust suppression measures will be put in place to minimise dust levels on the site and in the surrounding environment.

Any additional soil materials that are to be imported to the site will be required to have certification of their chemical concentrations to ensure that contaminative materials are not being introduced to the area.

Speed restrictions will be imposed on site to minimise disturbance of bare surfaces and the amount of disturbed surfaces left exposed for significant time periods will be minimised.

## 10 Traffic and Infrastructure

Construction of the Solar Park will require the delivery of items of plant and equipment to the site, in addition to the deliveries of aggregate, concrete and Geogrid for the construction of access tracks and foundations for the electrical buildings. The operational phase of the project will require very few, infrequent visits to site by maintenance staff (approximately two visits every month).

An indicative layout of the proposed Solar Park site is shown in Figure 1.2 of this ER. This shows how the PV panels will be arranged across the site and provides the likely locations of inverters, transformers, access tracks and the construction laydown area.

Site access routes for construction traffic would be determined by the source of the materials brought to site. Deliveries are anticipated to approach the site along the M4 where they will enter the Hoel Maes Eglwys road and then the Rhyd-Y-Pandy Road. These roads are frequently used by large vehicles.

### 10.1 Construction

The existing site entrance located in the north east corner of the site will be improved to allow access for construction and operational vehicles. From this access point, approximately 1.1 km of tracks will be put in place to allow delivery of inverters, transformers and the switchgear to their proposed location on the site. A construction compound will be created adjacent to this access track for lay down of equipment during construction.

Access tracks will be up to 3 m nominal width and may require micro siting to avoid ground hazards, steep gradients and environmental constraints encountered on site.

The access tracks will be constructed of a thin layer of compacted stone, with a nominal thickness of c.300 mm that will be underlain by Terram or similar.

Vehicles will be required to bring construction staff, construction equipment, materials and the PV panels to the site. The peak traffic movements would be associated with the installation of the c. 25,000 PV panels.

#### 10.1.1 Construction Staff

About 50 construction staff are expected onsite at any one time. This would represent a maximum of perhaps 30 vehicles or 60 traffic movements per day. This represents a minimal increment to the existing levels of car traffic currently experienced on the public roads that lead to the site.

The use of mini-buses and car sharing would be encouraged to reduce the number of vehicular movements. A worst case would be that all vehicles would arrive during the morning peak hour and leave during the evening peak hour. There would be no night time working, unless agreed in advance with the local authority.

Construction staff vehicles will park on a dedicated area of the site and thus would not block any access tracks or exiting roads in the vicinity of the site.

#### 10.1.2 Construction Equipment

Any excavators, compactors, generators and other such equipment will be brought to site by low loader. Additional site vehicles may be required to expedite the construction phase.

The majority of the construction equipment will be brought to site in the first few weeks of the construction programme. The access tracks and laydown area would be laid and then the deliveries of panels, mounting systems and inverters would begin.

### **10.1.3 Access Road Construction and access improvement**

Standard 20 tonne tipper trucks will be used for the delivery of aggregate for the construction of the access tracks. Approximately 99 lorry loads will be required to deliver aggregate that will also be required. A conscious effort will be made to source materials locally where possible to minimise traffic creation and maximise the benefit to the local economy.

Trucks bringing deliveries of aggregate to site are likely to be spread throughout the working day and are not expected to impact significantly on local traffic levels.

As discussed above deliveries are anticipated to approach the site along the M4, Heol Maes Eglwys Road and Rhyd-Y-Pandy Road, all of which are frequently used by large vehicles.

### **10.1.4 Foundation Pouring**

Use of concrete on site is not expected to be extensive and will likely be limited to the creation of the foundations for the electrical buildings. Up to 32 conventional concrete mixer trucks are expected to bring concrete to site (each carrying 5 m<sup>3</sup> of concrete).

There are a number of places which are relatively local to the site which would be able to supply the necessary concrete materials for construction. As for the delivery of aggregate and other construction materials the trucks bringing deliveries of concrete to site would be spread throughout the working day and are not expected to impact significantly on local traffic levels.

### **10.1.5 Inverters and Transformers**

The prefabricated inverters and transformer would be brought to site by HGV. Up to 18 deliveries in total may be required depending on the type of inverters chosen.

In addition, a vehicle would be required to bring a small crane to site (pivoting radius approximately 7 m) to unload the inverters from the HGVs and place them on their foundations.

### **10.1.6 Cabling**

Of the order of 5 trucks would visit the site to deliver cabling to connect the panels to the inverters and the inverters to the transformer.

The cables would be either backfilled or buried with sand. If sand is used approximately 25 trucks would bring the sand to site. Sand would be sourced from local sand suppliers in the vicinity of the site if suitable.

### **10.1.7 Panels and Mounting Systems**

Panels will be delivered to site in HGVs. Based on information from turnkey contractors it is anticipated that approximately 20 deliveries of panels will be required. One HGV can carry up to 1,300 panels.

The mounting systems on which the panels would be fixed would be delivered to site by HGV. Approximately 12 trucks would be required.

### **10.1.8 Fencing and Miscellaneous Items**

Deer fencing (Figure 4.4) will be installed around the site. This will comprise wooden posts and wire mesh. Any other miscellaneous equipment would also be brought to site by truck. It is anticipated that no more than 15 trucks would be required for these items.

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### 10.1.9 Total Movements of HGVs and Concrete Mixers

In addition to construction staff transport for the proposed development, Table 10.1 and Table 10.2 list the number of HGVs and concrete mixers which are expected over the 4 month construction period.

**Table 10.1: Expected Number of HGVs and Concrete Mixers**

| Item being Delivered                | Vehicle Used        | Quantity   |
|-------------------------------------|---------------------|------------|
| Panels                              | HGV with low loader | 20         |
| Mounting System                     | HGV with low loader | 12         |
| Inverters and transformers          | HGV with low loader | 18         |
| Switchgear & Housing                | HGV with low loader | 3          |
| Small crane (delivery & collection) | HGV with low loader | 2          |
| Machinery (delivery & collection)   | HGV with low loader | 16         |
| Cables                              | 10T Trucks          | 30         |
| Various small deliveries            | 10T Vehicle or less | 15         |
| Concrete                            | Concrete Mixers     | 32         |
| Aggregate                           | HGV                 | 99         |
|                                     |                     |            |
| <b>Total</b>                        |                     | <b>247</b> |

## 10.2 The Construction Programme

An indicative construction programme is provided in Table 10.2. The construction programme assumes a worst case scenario of a 4 month construction programme which increases the number of vehicles arriving at site during the peak of the construction phase.

**Table 10.2: HGV Traffic Movements during Construction**

| Construction Activity                  | Month      |           |           |          | Total      |
|----------------------------------------|------------|-----------|-----------|----------|------------|
|                                        | 1          | 2         | 3         | 4        |            |
| Delivery of Concrete                   | 32         |           |           |          | 32         |
| Delivery of Aggregate                  | 99         |           |           |          | 99         |
| Delivery and Collection of Machinery   | 8          |           |           | 8        | 16         |
| Delivery of Inverters and Transformers |            |           | 18        |          | 18         |
| Delivery of Switchgear and Housing     |            |           | 3         |          | 3          |
| Delivery and Collection of Small Crane | 1          |           |           | 1        | 2          |
| Delivery of Panels                     |            | 10        | 10        |          | 20         |
| Delivery of Mounting System            |            | 12        |           |          | 12         |
| Delivery of Cabling                    |            | 15        | 15        |          | 30         |
| Various Small Deliveries               | 5          | 5         | 5         |          | 15         |
| <b>Total</b>                           | <b>145</b> | <b>42</b> | <b>51</b> | <b>9</b> | <b>247</b> |

As can be seen in Table 10.2 peak traffic is likely to occur during the first month of construction. From the above construction programme, a worst case figure of 145 deliveries spread over 4 weeks (Month 1) is expected. This is equivalent to an average of less than 1 delivery, or 2 traffic movements, per working hour (i.e. 4 weeks, 6 day weeks, 10 hour days). These movements represent a minimal increment to the existing traffic levels on the public roads leading to the site. Any inconvenience caused to local road users will be temporary in nature.

The construction traffic will be required to use the route, or routes, agreed with the Highways Authority as / if required. These could be enforced by formal instructions in the construction contract and through the use of road signs locally.

Timings of construction traffic movements would be restricted to between 8 am and 6 pm. However peak hours, such as those for school journeys (typically between 8 am to 9 am and 3 pm to 4 pm), would be avoided if the Highways Authority consider this to be necessary once the final routes are agreed.

### 10.3 Logistics

The transportation investigations undertaken for the purposes of this report and the associated planning application suggest that the most appropriate means of accessing the site would be via the M4, Hoel Maes Eglwys Road and Rhyd-Y-Pandy Road.

The exact location of PV panel and inverter / transformer manufacturers will not be known until receipt of planning permission and contract award. It is understood that PV manufacturers had been looking to set up factories in the UK and could supply the panels for the project. Were the panels not to be

sourced locally then it may be the case the panels are shipped from overseas to a suitable port such as Bristol from where they can be brought to site.

Cleanliness of the existing roads will be maintained at all times. Construction plant and vehicles will not be permitted to deposit mud or other debris onto the existing road system. Temporary wheel-washing facilities will be provided on site.

The environment and amenity of communities should not be unduly affected by the impacts of traffic resulting from the development of the Solar Park as the majority of the potential access routes are away from major settlements.

## 10.4 Operation

During the operational phase of the Solar Park, traffic will generally be associated with site visits by maintenance and operations personnel. These visits are likely to be limited and infrequent. At present it is estimated that 2 visits a month could be expected for servicing and routine inspection. This will involve very few vehicular movements. Impacts on traffic levels during operation are therefore expected to be negligible.

Parking for site associated traffic during the operational phase will be on site at the site entrance.

It is proposed that the existing access point in the north east corner of the site will be improved for construction and operational traffic. This access point will provide access off Rhyd-Y-Pandy Road as detailed in Appendix H.

## 10.5 Decommissioning

Decommissioning of the Solar Park will require access for heavy goods vehicles to the site to remove all items of plant, including the PV panels, inverters, transformer and associated infrastructure. The number of vehicles expected during decommissioning would be less than the number of vehicles expected during the construction phase. This is due to the fact that a proportion of the foundations would remain in situ. The foundations would be removed to approximately 1 m below ground level, and then buried using topsoil. This is expected to cause less environmental impact than removing them in their entirety. Therefore, there will not be traffic corresponding to the removal of the concrete.

The impacts during decommissioning will be temporary in nature and would be unlikely to give rise to significant impacts to local traffic and infrastructure.

## 10.6 Conclusions

The construction phase of the Solar Project will require of the order of 247 visits, associated with the delivery of cranes, building materials and panels. Additionally, there will be approximately 60 traffic movements per day associated with construction staff during peak periods of construction activity. These traffic movements are not anticipated to have a significant effect on existing traffic levels in the vicinity of site. No construction vehicles would be allowed to deposit mud on the roads with wheel washing facilities used if required.

Very few, infrequent traffic movements are associated with the operational phase of the development and will be associated with maintenance staff. These maintenance visits will have a minimal impact on the road network of the surrounding area.

## 11 Air Quality

Construction of the proposed Solar Park may result in the emission of dust due to wind blowing over, for example bare earth and exposed soils, in addition to emissions of oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), particulate matter (PM) and sulphur dioxide (SO<sub>2</sub>) from vehicle exhausts. Local air quality in the surrounding area with respect to these pollutants is good and does not exceed the UK's National Air Quality Objectives as would be expected for a rural location.

Dust could be emitted during several activities associated with the construction works if preventative measures are not taken. Dust could arise from: earth moving operations for excavation and back filling of foundations; blow-off and spillage from vehicles; concreting operations; site reinstatement; and, road construction.

Construction operations will be conducted so as to minimise the generation and spread of dust in order to prevent construction work generating levels of atmospheric dust that would constitute a health hazard or nuisance to people working on the site or living nearby.

If potential for dust emissions exist, for example on dry windy days, then the following procedures will be followed:

- Materials will be tested for moisture content;
- If material is dry then water will be sprayed on to the working area to suppress dust;
- Excavation faces not being worked will, if required, be either sheeted or treated with a chemical dust suppressant;
- The amount of disturbed surfaces left exposed for significant time periods will be minimised; and
- All operatives working in areas of potential dust emission will be provided with paper type face masks.

Materials deposited on stockpiles on site will be closely monitored for any emission of dust and if required they will be damped down, covered or treated with a dust suppressant.

If finely ground materials are delivered, these will be in bag form or stockpiled in specified locations where the material can be suitably covered or damped down as necessary. All vehicles carrying bulk materials into or out of the site will be covered to prevent dust emission. Minimum drop heights will be used during material transfer.

A temporary wheel and chassis washing facility may be provided adjacent to the site exit and will be used by all heavy commercial vehicles leaving the site, preventing the transmission of soil from the site to the public highway. Vehicles will be encouraged to reduce their speed while moving around the site during dry weather to minimise disturbance.

The above measures may only be necessary should the activities leading to the greatest dust generation occur during a dry period. The use of the above methods should ensure that dust emissions will not impact on local air quality.

In addition to dust, there will be emissions associated with the construction machinery and vehicles, such as the exhaust from diesel powered equipment. However, these will be easily dispersed by the prevalent winds at the site. It is likely that no more than five or six construction vehicles would be present on site at any one time. Any associated odour would be very minor and local in nature and would again be quickly dispersed.

With suitable techniques employed and a short construction time, the residual impact on air quality is expected to be minor.

During operation, the PV panels and associated equipment will not emit any emissions of pollutants or odours to air. Emissions from maintenance vehicles will be insignificant.

During decommissioning, the impacts of emissions from fixed and mobile plant and vehicles are likely to be minor and similar in scale to those associated with construction. There may be some dust generated during the decommissioning of the proposed Solar Park. However, this will not be to the same extent as that during the construction phase, as there will be little earth moving required and therefore excavation activities will be limited. Demolition of the proposed Solar Park will be conducted so as to minimise the generation and spread of dust. There will be no significant impact on nearby housing.

### **11.1 National and Global Air Quality**

Nationally and globally, a significant benefit of the use of solar power rather than fossil fuels is the reduction of emissions of environmentally harmful gases.

These benefits are associated with the prevention of emissions of CO<sub>2</sub>, SO<sub>2</sub>, oxides of nitrogen NO<sub>x</sub>, PM and VOCs arising from the combustion of fossil fuels.

There are a number of annual average UK household electricity consumptions quoted by various credible sources. BEIS now estimates the average consumption to be below 4,000 kWh with average consumption in 2017 being about 3,760 kWh. It can be calculated using the 2017 figure that the proposed Solar Park will provide up to 2,646 households with renewable energy annually.

The generation of electricity from solar power therefore represents a saving on the pollutants that could otherwise be omitted by fossil fuel fired power stations to generate power for this number of homes.

## 12 Cumulative Impacts

### 12.1 Other development

There are three large scale development proposals within 5km of the proposed Afon Llan Solar Park (hereafter referred to as 'the proposed Solar Park');

- 1) 2018/1289/DCO: Approved. Abergelli Farm Gas Fired Power Station located at Abergelli Farm (hereafter referred to as Abergelli Power Station'; located 25m to the west of the western boundary of the proposed Afon Llan Solar Park at the nearest point;
- 2) 2008/1685: Consented. The installation of a new electrical connection was approved in the form of a new 400kV underground cable to export power from the Abergelli Farm Gas Fired Power Station to the National Grid Electricity Transmission System at Swansea North Substation, including associated engineering operations and landscaping (hereafter referred to as the electrical connection); and
- 3) 2019/2338/PRE: Pre-Application Stage Only. A battery storage and energy management facility on land to the west of Rhyd-y-Pandy Road, Felindre, Swansea. This facility is some distance from the Rhyd-y-Pandy Road, being proposed for the field to the north east of Abergelli-fach plantation, roughly 600m east of Lletty Morfil Farm and 500m south of Abergelli Farm.

The potential cumulative impacts of the Solar Park with each of these three developments is assessed below.

#### 12.1.1 Abergelli Power Station and Electrical Connection

The power station development and electrical connection were approved in September 2019. It is stated by the developer that '*Subject to a capacity market contract, Abergelli Power Station could go into operation in late 2022*'. Despite this the proposed construction timetable and final design details for the development are unclear. If considered necessary, an additional cumulative impact assessment will be completed should additional design details be available prior to the submission of the proposed Afon Llan Solar Park application.

No cumulative impacts are predicted as a result of the Abergelli Power Station and the proposed Afon Llan Solar Park for the reasons set out below.

##### 12.1.1.1 Landscape and Visual

The proposed Solar Park will result in only a negligible to low landscape or visual change from any of the assessed viewpoints from which both developments would be visible. In addition due to existing vegetation and topographical screening and the low impact nature of the proposed solar park there is little to no intervisibility of the power station and the proposed Solar Park at any of the viewpoints from which potentially significant impacts were predicted as a result of the power station. Potentially significant cumulative impacts are therefore considered to be unlikely.

##### 12.1.1.2 Ecology and Ornithology

No off-site impacts are anticipated during the construction or operational stages of the proposed Afon Llan Solar Park and therefore no cumulative impacts will occur.

#### **12.1.1.3 Cultural heritage**

The proposed Solar Park will result in only a negligible impact on any of the assessed designated heritage assets. Due to existing vegetation and topographical screening surrounding the site and the low impact nature of the proposed Solar Park, potentially significant cumulative impacts are therefore considered to be unlikely.

#### **12.1.1.4 Noise**

Due to the nature of the proposed construction activities, potential noise impacts during the construction of the proposed Solar Park will be limited to approximately 90m from the construction activity and will be for only a very short period of time. Taking into consideration the noise restrictions placed upon the Abergelli Power Station Development during construction and operation cumulative noise impacts are considered to be unlikely.

#### **12.1.1.5 Geology, hydrology and hydrogeology**

No off-site or on-site impacts are anticipated during the construction or operational stages of the consented Abergelli Power Station or the proposed Afon Llan Solar Park and therefore no cumulative impacts will occur.

#### **12.1.1.6 Traffic and infrastructure**

The construction and operational traffic for the Abergelli Power Station will not use the same routes proposed for the Afon Llan Solar Park and therefore no cumulative impacts will occur regardless of the proposed construction timescales.

#### **12.1.1.7 Air Quality**

It is considered unlikely that the construction phase of the Solar Park will coincide with that of the Abergelli Power Station. In addition, any dust as a result of the proposed construction works at the proposed Solar Park site will be minimal making significant cumulative impacts unlikely.

Any vehicle emissions during construction of the proposed Solar Park will be minimal and localised with less than 10 vehicles likely to be on site at any one time. When wind dispersal of any emissions is taken into account no cumulative air quality impacts as a result of construction works are anticipated.

### **12.1.2 A Battery Storage and Energy Management Facility on land to the west of Rhyd-y-Pandy Road**

The Development will import and export electricity but will not generate any additional electricity. The proposed batteries will store surplus electricity to be fed into the grid when required, while the energy management modules will reduce fluctuations, thus improving stability and reducing the risk of power failures. The total capacity of the facility will be 49.9 megawatts (MW) or below.

The Development is anticipated to include the following components, as shown on the Site Layout Plan:

- Battery storage units;
- Energy management building containing energy management modules, coolers, and e-houses;
- Electrical infrastructure including inverters, transformers, grid connection, switchgear and underground cabling;

- Site office and welfare area;
- Control room;
- New site entrance;
- On site access track and parking area;
- Security perimeter fencing; and
- Landscaping and planting.

This application is at pre-application stage only and the timing of any future submission is unknown. There is insufficient detail currently available to complete a detailed cumulative impact assessment. If considered necessary, a detailed cumulative assessment will be completed should additional documentation be available prior to the submission of the proposed Afon Llan Solar Park application.

## **Appendix A      Local Authority Screening Opinion**



# City & County of Swansea / Dinas a Sir Abertawe

## Directorate of Place / Cyfarwyddiaeth Lleoedd

### Planning and City Regeneration / Cynllunio ac Adfywio'r Ddinas

Civic Centre, Oystermouth Road, Swansea, SA1 3SN  
Y Ganolfan Ddinesig, Heol Ystumllwynarth, Abertawe, SA1 3SN  
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✉ [planning@swansea.gov.uk](mailto:planning@swansea.gov.uk) / <http://www.swansea.gov.uk>

Ms Charlotte Peacock,  
Wessex Solar Energy,  
Citypoint 2  
25 Tyndrum Street  
Glasgow  
Scotland  
G4 0JY

*Please ask for:*

Lynne Davies

*Direct Line:*

01792 635726

*E-mail:*

[lynne.davies@swansea.gov.uk](mailto:lynne.davies@swansea.gov.uk)

*Date:*

27 November 2019

Dear Ms Peacock,

### **TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (WALES) REGULATIONS 2017**

**Application No:** 2019/2592/SCR  
**Site Location:** Land North Of Afon Llan / Maese glwys Farm, Clydach, Swansea  
**Proposal:** SCREENING OPINION to determine whether or not an Environmental Impact Assessment is required to be submitted for a proposed 9MW solar park

I refer to above screening opinion request.

It has been necessary for the Local Planning Authority to adopt a screening opinion to comply with the above Regulations.

In accordance with the above Regulations, please find enclosed a copy of the screening opinion of the Local Planning Authority, which is that an Environmental Impact Assessment is **not** required.

Yours sincerely

*A R Thomas*

**RYAN THOMAS**  
**DEVELOPMENT, CONSERVATION & DESIGN MANAGER**



## TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (WALES) REGULATIONS 2017

**APPLICATION NO:** 2019/2592/SCR  
**FOR:** SCREENING OPINION to determine whether or not an Environmental Impact Assessment is required to be submitted for a proposed 9MW solar park  
**AT:** Land North Of Afon Llan / Maese glwys Farm, Clydach, Swansea

**Identified category of development:** The development proposed, falls within the description in Column 1, Section 3 (a), of the table in Schedule 2 to the 2017 regulations – as “Industrial installations for the production of electricity, steam and hot water”

**Assessment:** Having taken into account the criteria in Schedule 3 to the above Regulations it is not considered that the development would be likely to have significant effects on the environment by virtue of factors such as its nature, size or location.

**Decision:** Environmental Impact Assessment is not required.

Principal  
Planner

*Andrew Ferguson*

Date

27/11//2019

## **SCREENING OPINION REPORT - Planning REF: 2019/2592/SCR**

### **Land North Of Afon Llan / Maeseglwys Farm, Clydach, Swansea**

#### **Screening Opinion Request – The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017**

In accordance with Regulation 6 of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, a screening opinion request has been submitted to the Local Planning Authority to determine whether or not an Environmental Impact Assessment (EIA) is required.

Schedule 3 of the Regulations sets out the selection criteria, which must be taken into account in determining whether a development is likely to have significant effects on the environment. Not all criteria will be relevant in every case.

#### **Proposal**

The proposal is for a 9MW solar farm development. A screening opinion was previously provided by the local planning authority (LPA) in November 2014 and this concluded that an Environmental Impact Assessment (EIA) would not be required. The previous screening opinion related to the anticipated generation of up to 5MW of power within the same area of approximately 16.5ha. However, given the passage of time, increase in MW provision, changes to planning policy, planning legislation and the approval of other developments in the area, it was considered that the proposal should be re-screened.

#### **Requirement for EIA Screening**

As the proposed development would involve the production of electricity on a site that exceeds 0.5ha, it would fall within Category 3 (Energy Industry) (a) Schedule 2 (a) of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017.

Schedule 3 of the Regulations sets out the selection criteria, which must be taken into account in determining whether a development is likely to have significant effects on the environment. Not all criteria will be relevant in every case.

#### **1. Characteristics of Development**

##### *(a) The size and design of the development*

The proposed development would take place on an area of some 16.5ha of mainly low grade farmland. The proposed site lies approximately 1.9 km from Clydach, is approximately 650 m to the north of Pant-lasau with Felindre approximately 2.4 km to the north west. The PV panels will be placed on structures inclined at between 25 and 35 degrees facing to the south with a maximum height of 3.5 m from ground level. To ensure that the panels remain in their proper position they will be fixed onto steel

frames that will, in turn, either be set into purpose built concrete foundations or piled into the ground depending on the ground conditions of the site.

There are a small number of scattered houses in the vicinity of the site. The closest of these are Felin-Wen Court and Felin Wen Farm located approximately 30m/48m to the south east and south respectively, with Cefn Betingau solar farm complex 100m to the north, Pen-y-fedw about 250 m north east, Maes-eglwys Farm, approximately 330m south -west and Llyn-Y-Fan approximately 500m to the north. The low rise nature of the proposed solar park is not considered to give rise to unacceptable residential impact.

*(b) The cumulation with other existing development and/or approved development*

The Cefn Betingau solar farm complex lies approximately 100m to the north, with the recently approved Abergelli Power Station (Ref: 2018/1289/DCO) approximately 255m to the northwest. The low rise nature of the proposed and existing solar park is not considered to give rise to unacceptable cumulative visual impact, especially having regard to the approved large infrastructure project at Abergelli Farm.

*(c) The use of natural resources, in particular, land, soil, water and biodiversity*

The proposal would take place on low grade agricultural land. For the most part, soil would remain in situ and would not be adversely affected by the development, nor would the proposal likely result in any significant adverse impacts upon the water environment that could not be mitigated. In this respect, Welsh Government guidance set out within 'Planning Implications of Renewable and Low Carbon Energy (2011)' states that impacts in relation to hydrology and flood risk are unlikely to be significant because the presence of solar arrays will not greatly increase the time for rainwater to reach the ground where it can infiltrate in the usual way and because the panels will typically cover no more than one third of the site area. The guidance states that the effects of the panels, in combination with access tracks, earth works, buildings for inverters, cable trenches and site drainage works will nevertheless need to be assessed. It is considered that the site has relatively low ecological value but this would be considered further as part of any planning application through the submission of ecological surveys of the site.

*(d) Production of waste*

As the proposed development is for the renewable production of energy through solar PVs the proposal is unlikely to result in the production of significant amounts of waste during operation. Waste during construction is unlikely to cause significant environmental impacts.

*(e) Pollution and nuisances*

There is a potential for pollution and nuisance to arise at construction/installation stage. The main concerns relates to the possibility of contaminated waters running in an uncontrolled manner into watercourses (including ditches) and the potential for noise and disturbance from construction traffic and construction activities taking place in and around the site. Best practice is therefore recommended comprising a method

statement detailing all pollution prevention measures. Such information could be submitted with a planning application or could be addressed by conditions. The site lies within a Coal Mining Risk area and as such a coal mining risk assessment to assess the risk to the development from former coal mining workings and provide mitigation measures as necessary will need to be submitted and assessed as part of any future planning application.

*(f) the risk of major accidents and/or disasters relevant to the development concerned, including those caused by climate change, in accordance with scientific knowledge*

In view of the nature of the proposed development the risk of a major accident that could have significant environmental impacts is considered to be negligible.

*(g) the risk to human health (for example due to water contamination or air pollution)*

In view of the nature of the proposed development, the risks to human health are considered to be low and any residual risks, it is considered, could be mitigated through best practice pollution prevention measures.

## **2. Location of Development**

*(a) the existing and approved land use*

The site areas are used for agriculture/grazing. The application is not within a designated Special Landscape Area (SLA) area under LDP Policy ER5 and is not within a Local Search Area (LSA) for solar PVs under Policy EU1. Moreover, the site is not located within a 'sensitive area' as defined within the EIA Regulations.

Notwithstanding this in order to fully consider the impact of the development upon the local and wider landscape any planning application would need to be accompanied by a landscape and visual impact assessment.

*(b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;*

None of the site lies within any national or international ecological or landscape designation. There will be some disturbance of land during construction phase and such matters would need to be fully considered at the planning application stage in order to ensure compliance with LDP Policies.

*(c) the absorption capacity of the natural environment, paying particular attention to the following areas— (i) wetlands, riparian areas, river mouths;*

N/A

*(ii) coastal zones and the marine environment;*

The nature and location of the development is approximately 6.5km from the coastal zone is such that it is unlikely to result in any significant environmental impacts upon coastal areas provided pollution control methods are conditioned.

*(iii) mountain and forest areas;*

N/A

*(iv) nature reserves and parks;*

N/A

*(v) European sites and other areas classified or protected under national legislation;*

The proposed development is not within a designated site (Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPAs), National Nature Reserves (NNRs) or Ramsar site) and there are none of these sites within 2 km.

The application will need to be accompanied by ecological surveys and drainage information. However, in view of the nature of the development, it is considered unlikely that the proposal would result in any significant impacts that could not be adequately mitigated.

*(vi) areas in which there has already been a failure to meet the environmental quality standards laid down in Union legislation and relevant to the project, or in which it is considered there is such a failure;*

N/A

*(vii) densely populated areas;*

Other than potential visual impacts, it is considered that the proposed development would not result in any significant environmental impacts upon the densely populated areas of Swansea to the north, south and west of the site.

*(viii) landscapes and sites of historical, cultural or archaeological significance.*

No significant impacts upon the historic environment are envisaged, however, a desk based study would need to be undertaken to consider the impacts of the development upon the historic environment.

### **3. Types and characteristics of the potential impact**

*(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);*

The magnitude of the development in terms of the site area and the size of the population that may be affected, having regard to the nature of the development, is not considered to be significant in EIA terms with likely impacts being limited to a local level.

*(b) the nature of the impact;*

The general environmental impacts relating to solar farms are considered to be well understood, with the main impacts relating to visual, ecological, glint and glare, and drainage impacts, together with pollution and traffic impacts during the construction phase and, potentially, the decommissioning phase.

*(c) the transboundary nature of the impact;*

N/A

*(d) the intensity and complexity of the impact;*

The general environmental impacts relating to solar farms are considered to be well understood. The environmental impacts relating to pollution and traffic impacts will be more intense during the construction and decommissioning phase. Such impacts may be appropriately managed through good traffic management, construction and pollution prevention measures.

The impacts arising from the operational phase would generally be limited to visual impacts, ecological impacts, glint and glare impacts and drainage impacts. Such impacts, given the nature of the development, are not considered to be especially unusual or complex.

*(e) the probability of the impact;*

With appropriate mitigation measures to address the potential impacts, there is unlikely to be significant localised environmental impacts.

*(f) the expected onset, duration, frequency and reversibility of the impact;*

Impacts arising during the construction and decommissioning phases would be largely limited to the duration of the works which are proposed to last approximately 3 months. The development is likely to be in place for approximately 40 years as such any visual impacts are likely to persist for the duration of the operational phase.

*(g) the cumulation of the impact with the impact of other existing and/or approved development;*

The development is in very close proximity to the existing Cefn Betingau Solar Park and close to the consented Abergelli Power Station development and as such, the cumulative impacts of the proposed scheme will need to be fully considered. On the basis of the information submitted it is considered unlikely that the proposal, even in combination with existing and approved developments, would result in any significant environmental impacts that could not be mitigated through appropriate design measures.

*(h) the possibility of effectively reducing the impact.*

It is anticipated that any potential environmental impacts associated with the development could be effectively mitigated, for example, through the design/siting/landscaping of the development or through good construction and pollution prevention measures. Such measures, if necessary, can be fully considered at the application stage.

## **Conclusion**

The proposed development is for a new 9 mw solar farm adjacent to the existing solar farm at Cefn Betingau. The broad environmental impacts of solar farms are considered to be well understood. Welsh Government guidance set out within 'Planning Implications of Renewable and Low Carbon Energy (2011)' states that along with ecological sensitivity, landscape sensitivity to the proposed development will be a key factor in determining whether an EIA is required and sensitive locations should be avoided where possible.

In this instance the screening site is not within a Special Landscape Area (SLA) within the LDP and is not located within a 'sensitive area' as defined within the EIA Regulations. The proposal would be visible from some public views and will result in a large scale development in the open countryside that will persist for approximately 40 years. However, in view of the scale of the development relative to its overall landscape setting and having regard to the sensitivity of the landscape, it is not considered that the proposal would result in any significant visual or landscape impacts other than localised impacts.

No significant ecological impacts have been identified and as such it is not considered that the proposed development, either alone or in combination with other developments, would result in any significant ecological impacts that could not be mitigated through the design/siting/landscaping of the development or through good construction and pollution prevention measures.

Overall, therefore, having taken into account the criteria of Schedule 3 to the EIA regulations, it is considered that the proposed development would not require an environmental impact assessment.

## Appendix B Schedule of Planning Policies

This Appendix provides a schedule of the planning policies identified in Section 3 as being relevant to the project. Plan Policies are reproduced word for word however Plan / Proposals Maps are not reproduced with internet links provided to these as appropriate should readers of this Environmental Report which to reference them.

### Swansea Development Plan

| Policy                                               | Text                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Policy PS 2: Placemaking and Place Management</b> | <p>Development should enhance the quality of places and spaces, and respond positively to aspects of local context and character that contribute towards a sense of place. The design, layout and orientation of proposed buildings, and the spaces between them, should provide for an attractive, legible, healthy, accessible and safe environment. All proposals should ensure that no significant adverse impacts would be caused to people's amenity. Depending on the nature, scale and siting of the proposal, development should also:</p> <ol style="list-style-type: none"> <li>I. Have regard to important elements of local heritage, culture, landscape, townscape, views and vistas;</li> <li>II. Ensure neighbourhoods benefit from an appropriate diversity of land uses, community facilities and mix of densities that in combination are capable of sustaining vibrancy;</li> <li>III. Create or enhance opportunities for Active Travel and greater use of public transport;</li> <li>IV. Integrate effectively with the County's network of multi-functional open spaces and enhance the County's Green Infrastructure network;</li> <li>V. Enhance public realm quality, incorporating public art where appropriate;</li> <li>VI. Provide for a hierarchy of interconnected streets and spaces; vii. Ensure active frontages onto streets and spaces to provide natural surveillance and character;</li> <li>VII. Provide an accessible environment for all;</li> <li>VIII. Provide appropriate parking and circulation areas for cars, cycles, motor bikes and service vehicles;</li> <li>IX. Deliver new, and/or enhance existing, connections to essential social infrastructure and community facilities;</li> <li>X. Maximise opportunities for sustainable construction, resource efficiency and contributions towards increased renewable or low carbon energy generation;</li> <li>XI. Avoid the loss of land and/or premises that should be retained for its existing use or as an area of open space;</li> <li>XII. Avoid unacceptable juxtaposition and/or conflict between residential and nonresidential uses;</li> </ol> |

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|                                                                                           | <p>XIII. Ensure no significant adverse impact on natural heritage and built heritage assets;</p> <p>XIV. Ensure resilience is not undermined and does not result in significant risk to human health, well-being or quality of life;</p> <p>XV. Ensure that commercial proposals, including change of use proposals:</p> <ul style="list-style-type: none"> <li>a. incorporate active frontages and shopfront designs that make a positive contribution to the streetscene,</li> <li>b. provide appropriate enclosure,</li> <li>c. relate well to the character of the host building,</li> <li>d. do not compromise the ability to deliver priority regeneration schemes. and</li> </ul> <p>XVI. Have regard to the implications for infrastructure and services.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Policy HC1<br/>Historic and<br/>Cultural<br/>Environment</b>                           | <p>The County's distinctive historic and cultural environment will be preserved or enhanced by:</p> <ul style="list-style-type: none"> <li>I. Requiring high quality design standards in all development proposals to respond positively to local character and distinctiveness;</li> <li>II. Identifying and safeguarding heritage assets, sites and their settings; Supporting heritage and cultural led regeneration schemes;</li> <li>III. Safeguarding and promoting use of the Welsh language.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Policy HC 2:<br/>Preservation or<br/>Enhancement<br/>of Buildings<br/>And Features</b> | <p>The County's buildings and features of historic importance will be preserved or enhanced through the following measures:</p> <ul style="list-style-type: none"> <li>i) Proposals for alteration and/or extension to a listed building or its curtilage must ensure that the special architectural character or historic interest is preserved;</li> <li>ii) The change of use of a listed building or its curtilage will only be permitted where this contributes towards the retention of a building or its sustainable re-use without having an adverse effect on its character, special interest or structural integrity;</li> <li>iii) Permission will not be granted for the total or substantial demolition of a listed building, unless there is the strongest justification and convincing evidence that the proposal is necessary;</li> <li>iv) Proposals which have a relationship to a listed building or its curtilage must ensure that the setting is preserved;</li> <li>v) Development within or adjacent to a conservation area will only be permitted if it would preserve or enhance the character or appearance of the conservation area or its setting. New development in such locations Swansea Local Development Plan must also be of a high standard of design, respond to the area's special characteristics, and pay</li> </ul> |

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|                                                                            | <p>particular regard to:</p> <ul style="list-style-type: none"> <li>a. Important views, vistas, street scenes, roofscapes, trees, open spaces, gaps and other features that contribute to the character or appearance of the conservation area;</li> <li>b. The retention of historically significant boundaries or other elements that contribute to the established form of development;</li> <li>c. The relationship to existing buildings and spaces, and grain of development;</li> <li>d. Scale, height and massing, architectural design, established architectural detailing, the use of materials, boundary treatment, and public realm materials.</li> </ul> <ul style="list-style-type: none"> <li>vi) Development proposed in relation to a locally important historic asset should not have a significant impact on the character and special local interest attributed to it. Permission will not be granted for the total or substantial demolition of an unlisted locally important building that makes a positive contribution to the character or appearance of an area, unless there is justification and evidence that the proposal is necessary;</li> <li>vii) The preservation or enhancement of Scheduled Ancient Monuments and their settings.</li> </ul> |
| <b>Policy ER 1:<br/>Climate<br/>Change</b>                                 | <p>To mitigate against the effects of climate change, adapt to its impacts and ensure resilience, development proposals should take into account:</p> <ul style="list-style-type: none"> <li>i) Reducing carbon emissions;</li> <li>ii) Protecting and increasing carbon sinks;</li> <li>iii) Adapting to the implications of climate change at both a strategic and detailed design level;</li> <li>iv) Promoting energy and resource efficiency and increasing the supply of renewable and low carbon energy;</li> <li>v) Avoiding unnecessary flood risk by assessing the implications of development proposals within areas susceptible to flooding and preventing development that unacceptably increases risk; and</li> <li>vi) Maintaining ecological resilience.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Policy ER 2:<br/>Strategic<br/>Green<br/>Infrastructure<br/>Network</b> | <p>Green Infrastructure will be provided through the protection and enhancement of existing green spaces that afford valuable ecosystem services. Development that compromises the integrity of such green spaces, and therefore that of the overall Green Infrastructure network, will not be permitted. Development will be required to take opportunities to maintain and enhance the extent, quality and connectivity of the County's multi-functional Green Infrastructure network, and where appropriate:</p> <ul style="list-style-type: none"> <li>i) Create new interconnected areas of Green Infrastructure between the proposed site and the existing strategic network;</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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|                                                                               | <ul style="list-style-type: none"> <li>ii) Fill gaps in the existing network to improve connectivity; and/or</li> <li>iii) In instances where loss of Green Infrastructure is unavoidable, provide mitigation and compensation for the lost assets.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Policy ER 5:<br/>Landscape<br/>Protection</b>                              | <p>Development will not be permitted that would have a significant adverse effect on the character and quality of the landscape of the County. Priority will be given to protecting, enhancing and managing the character and quality of the following Special Landscape Areas (SLAs), as shown on the Proposals Map and listed below:</p> <ul style="list-style-type: none"> <li>i) Mawr Uplands</li> <li>ii) Lower Loughor Valley and Estuary and Southern part of the Burry Inlet; and</li> <li>iii) North East Gower and Cockett Valley</li> <li>iv) Garngoch and Lower Afon Llan Valley Swansea Local Development Plan</li> </ul> <p>Within SLAs, development will only be permitted where there is no significant adverse impact, including cumulative impact, on the character and quality of the landscape. The development should aim to protect and enhance the features for which the SLA has been designated. Where appropriate, a Landscape Impact Assessment will be required in order to consider the impact of the development on the designated area. In exceptional circumstances, where development is necessary and could result in a significant landscape impact, a landscaping scheme will also be required and appropriate mitigation and enhancement measures should be provided.</p> |
| <b>Policy ER 6:<br/>Designated<br/>Sites of<br/>Ecological<br/>Importance</b> | <p>Development will not be permitted that would result in a likely significant adverse effect on the integrity of sites of international or national nature conservation importance, except in the circumstances specified in relevant legislation. Development that would adversely affect locally designated sites of nature conservation importance should maintain and enhance the nature conservation interest of the site. Where this cannot be achieved development will only be permitted where it can be demonstrated that:</p> <ul style="list-style-type: none"> <li>i) The need for the development outweighs the need to protect the site for nature conservation purposes;</li> <li>ii) There is no satisfactory alternative location for Swansea Local Development Plan the development that avoids nature conservation impacts; and</li> <li>iii) Any unacceptable harm is kept to a minimum by effective avoidance measures and mitigation, or where this is not feasible, compensatory measures must be put in place to ensure that there is no overall reduction in the nature conservation value of the area.</li> </ul>                                                                                                                                                                   |
| <b>Policy ER 8:<br/>Habitats and</b>                                          | <p>Development proposals that would have a significant adverse effect on the resilience of protected habitats and species will only be permitted</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

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| Species                                                                      | <p>where:</p> <ul style="list-style-type: none"> <li>iv) The need for development outweighs the nature conservation importance of the site;</li> <li>v) The developer demonstrates that there is no satisfactory alternative location for the development which avoids nature conservation impacts; and</li> <li>vi) Any unavoidable harm is minimised by effective mitigation to ensure that there is no reduction in the overall nature conservation value of the area. Where this is not feasible, compensation measures designed to conserve, enhance, manage and, where appropriate, restore natural habitats and species must be provided.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                        |
| Policy ER 9: Ecological Networks and Features of Importance for Biodiversity | <p>Development proposals will be expected to maintain, protect and enhance ecological networks and features of importance for biodiversity. Particular importance will be given to maintaining and enhancing the connectivity of ecological networks which enable the dispersal and functioning of protected and priority species. Development proposals that could result in an adverse effect on the connectivity of ecological networks and features of importance for biodiversity will only be permitted where:</p> <ul style="list-style-type: none"> <li>i) The need for the development outweighs the nature conservation value of the site;</li> <li>ii) It can be demonstrated that there is no satisfactory alternative location for the development;</li> <li>iii) A functional connected element of the natural resource is retained as part of the design of the development; and</li> <li>iv) Compensatory provision will be made of comparable or greater ecological value to that lost as a result of the development.</li> </ul> |
| Policy CV 2: Development in the Countryside                                  | <p>Outside defined settlement boundaries development will be required to ensure that the integrity of the countryside is conserved and enhanced. There is a presumption against development in the countryside, except where it is for:</p> <ul style="list-style-type: none"> <li>i) The purposes of agriculture, forestry or other rural enterprise;</li> <li>ii) The expansion of an existing rural business;</li> <li>iii) Affordable housing to meet local need at acceptable and sustainable locations within or adjoining settlements, or as minor extensions to small groups of dwellings in the countryside;</li> <li>iv) A rural exception site for employment in or adjoining a settlement;</li> <li>v) Development to allow a small business to operate from home;</li> <li>vi) One Planet Development;</li> <li>vii) Necessary infrastructure provision and enhancement of</li> </ul>                                                                                                                                                 |

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|                                                                                                           | <p>infrastructure networks; or</p> <p>viii) Recreational equine activities.</p> <p>Countryside development must be of a sustainable form with prudent management of natural resources and respect for the cultural heritage of the area. Wherever possible, existing buildings should be reused or adapted and if this is not feasible new buildings should be located within or close to existing groups of buildings. Proposals to increase the number of residential chalets within the chalet developments of Hareslade, Holts Field, Miles Lane and Sandy Lane will not be permitted.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p><b>Policy T 5:<br/>Design<br/>Principles for<br/>Transport<br/>Measures and<br/>Infrastructure</b></p> | <p>All proposals must ensure that the design of development, together with any supporting transport measures and infrastructure:</p> <ul style="list-style-type: none"> <li>i) Maximises the accessibility of the site via public transport and Active Travel;</li> <li>ii) Provides suitable facilities and a safe, attractive environment for pedestrians, cyclists and other non-motorised modes of transport;</li> <li>iii) Allows for the safe, efficient and effective movement of vehicles, inclusive of service vehicles;</li> <li>iv) Minimises vehicle speeds where appropriate;</li> <li>v) Considers the place and movement of any transport infrastructure in-line with Streets Hierarchy and User Hierarchy concepts to ensure appropriately designed transport infrastructure;</li> <li>vi) Does not encourage extraneous traffic unless there is a specific strategic need for an access route through the area;</li> <li>vii) Does not give rise to any significant adverse effect on the natural heritage, and the historic and cultural environment is preserved or enhanced;</li> <li>viii) Maintains the character of rural lanes and public paths;</li> <li>ix) Complies with the principles of Access For All;</li> <li>x) Accords with standards of good practice, Swansea Local Development Plan including the Active Travel Act Design Standards; and</li> <li>xi) Considers, and responds to, the findings of any relevant Travel Plan and/or Transport Assessment.</li> </ul> |
| <p><b>Policy T 7:<br/>Public Rights<br/>of Way and<br/>Recreational<br/>Routes</b></p>                    | <p>Development that significantly adversely affects the character, safety, enjoyment and convenient use of a PROW will only be permitted where an acceptable alternative route is identified and provided. Linkages, and where appropriate extensions, to the existing PROW network will be expected from all new developments, which must have regard to the existing character of the PROW and the aspiration to improve access for all.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p><b>Policy EU 1:<br/>Renewable and</b></p>                                                              | <p>Proposals for renewable or low carbon energy development will be</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

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| <p><b>Low Carbon Energy Developments</b></p> | <p>permitted subject to the following criteria:</p> <ul style="list-style-type: none"> <li>i) Strategic Search Area (SSA) Within or adjacent to the SSA, proposals for wind energy greater than 25MW will be permitted subject to criteria iii to v; all other proposals for renewable and low carbon energy will only be permitted where they can demonstrate they would not prejudice the purpose of the SSA.</li> <li>ii) Local Search Areas (LSAs) Solar PV: Within the LSAs, proposals for solar PV between 5 – 50 MW will be permitted subject to criteria iii to v. All other proposals for renewable and low carbon energy will only be permitted where they can demonstrate they would not prejudice the purpose of the LSA.</li> <li>iii) Proposals for all types of renewable and low carbon energy development and associated infrastructure, either on their own, cumulatively or in combination with existing, approved or proposed development, should comply with all other relevant policies in the Plan and should not have a significant adverse effect on: <ul style="list-style-type: none"> <li>a. The characteristics and features of the proposed location as a result of the siting, design, layout, type of installation and materials used;</li> <li>b. public amenity or public accessibility to the area;</li> <li>c. Radar, Aircraft Operations or Telecommunications;</li> <li>d. carbon sinks, or it can be demonstrated that on-site loss can be adequately mitigated;</li> </ul> </li> <li>iv) Satisfactory mitigation should be in place to reduce the impact of the proposal and its associated infrastructure; and in the case of solar proposals must mitigate against any impacts of glint and glare. Proposals shall make provision for the restoration and aftercare of the land for its beneficial re-use. This will be agreed with the Council prior to the development being carried out.</li> <li>v) Where necessary, additional compensatory benefits will be sought by agreement with the applicants in accordance with Policy IO 1 Supporting Infrastructure.</li> </ul> |
| <p><b>Policy RP 2: Noise Pollution</b></p>   | <p>Where development could lead to exposure to a source of noise pollution it must be demonstrated that appropriate mitigation measures will be implemented, and incorporated into the design of the development to minimise the effects on existing and future occupants. Noise sensitive developments will not be permitted unless effective and appropriate mitigation is carried out to prevent exposure to existing noise generating uses.</p> <p>Development will not be permitted if it would cause, or result in, a significant increase in levels of Swansea Local Development Plan environmental noise in an identified Noise Action Planning Priority Area, or would have unacceptable impacts on an identified Quiet Area or the</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

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|                                                                                   | characteristics of tranquillity that led to the designation of a Quiet Area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Policy RP 3:<br/>Air and Light<br/>Pollution</b>                               | Where development could lead to exposure to a source of air or light pollution it must be demonstrated that appropriate mitigation measures will be implemented, and incorporated into the design of the development to minimise the effects on existing and future occupants                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Policy RP 5:<br/>Avoidance of<br/>Flood Risk</b>                               | <p>In order to avoid the risk of flooding, development will not be permitted:</p> <ul style="list-style-type: none"> <li>i) In areas at risk of fluvial, pluvial, coastal and reservoir flooding, unless it can be demonstrated that the development can be justified in-line with national guidance and is supported by a technical assessment that verifies that the new development is designed to alleviate the threat and consequences of flooding;</li> <li>ii) In areas at risk of flooding from local sources, unless the Council is satisfied with the proposed drainage strategy;</li> <li>iii) Where it would lead to an increase in the risk of flooding on the site or elsewhere from fluvial, pluvial, coastal or increased water run-off from the site;</li> <li>iv) Where it would have a detrimental effect on the integrity of existing fluvial, pluvial or coastal flood defences;</li> <li>v) Where it would impede access to existing and future tidal and fluvial defences for maintenance and emergency purposes; or</li> <li>vi) Where the proposal does not incorporate environmentally sympathetic flood risk mitigation measures, such as SuDS, unless it Swansea Local Development Plan can be demonstrated that such measures are not feasible.</li> </ul> |
| <b>Policy RP 12:<br/>Sustainable<br/>Development<br/>of Mineral<br/>Resources</b> | <p>The efficient and appropriate use of minerals within the County will be encouraged, including the re-use and recycling of suitable minerals as an alternative to primary won aggregates. The extraction of mineral resources will be permitted where they satisfy the following criteria:</p> <ul style="list-style-type: none"> <li>i) It can be demonstrated that there is a requirement for the mineral to meet the need of society either nationally, regionally or locally, and the need cannot be met from secondary or recycled materials or existing reserves;</li> <li>ii) The proposed end use of the mineral resource is appropriate and represents an efficient use of the resource;</li> <li>iii) The development would not cause demonstrable harm to the amenities of local communities, in particular with regard to access, traffic generation, noise, vibration, dust, air quality and odour;</li> <li>iv) The proposal would not result in any significant adverse impacts on public health and wellbeing;</li> <li>v) There would be no significant adverse impact, including visual impact, on the landscape, natural heritage, cultural and historic environments;</li> </ul>                                                                                  |

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|                                                    | <p>vi) There would be no significant adverse impact on the quality and quantity of controlled waters;</p> <p>vii) It can be demonstrated that no significant danger, damage or disruption would arise from subsidence or ground instability;</p> <p>viii) The minerals will be transported by rail or waterways wherever feasible; and</p> <p>Appropriate and progressive restoration and aftercare measures have been submitted, including post closure management of the site and the provision of other appropriate compensatory enhancements.</p>                                                                                                                                                                                                                                                                                     |
| <b>Policy RP 13:<br/>Safeguarding<br/>Minerals</b> | <p>Development within mineral safeguarding areas that would permanently sterilise identified resources of aggregates will only be permitted where it can be demonstrated that:</p> <p>i) The extraction of the mineral is impracticable, uneconomic or environmentally unacceptable;</p> <p>ii) The mineral has already been extracted or can be extracted satisfactorily prior to the development taking place;</p> <p>iii) The scale and location of the development would have no significant impact on the potential working of the resource; or</p> <p>iv) There is an overriding need for the development.</p> <p>Developments of a temporary nature will only be permitted where it can be demonstrated that the proposal will be implemented and the site restored within a timescale that the mineral is likely to be needed</p> |
| <b>Plan Map<br/>Hyperlink:</b>                     | <p><a href="https://www.swansea.gov.uk/article/48659/Adopted-Local-Development-Plan-LDP">https://www.swansea.gov.uk/article/48659/Adopted-Local-Development-Plan-LDP</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## **Appendix C      Suggested Planning Conditions**

- 1) The development hereby permitted shall be begun before the expiration of three years from the date of this permission.
- 2) The development hereby permitted shall not commence until such time as the detailed design specification of the solar panels and inverters and confirmation of their number and position shall be submitted to and approved in writing by the Local Planning Authority. The development shall proceed in accordance with the details approved.
- 3) There shall be no artificial lighting of the site unless otherwise agreed in writing by the local planning authority.
- 4) No construction activities shall be carried out on the site on any Sunday or Bank Holiday or outside the hours of 8.00 am and 6.00 pm Monday to Friday and Saturdays 8.00am to 1.00pm, unless agreed in writing with the Local Planning Authority.

## **Appendix D      Archaeological Reports**

## **APPENDIX D.1: DESK BASED ASSESSMENT**

Land at Afon Lan, Swansea  
Archaeology Desk-Based Assessment  
December 2019

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**Report**

Archaeology Desk-Based Assessment

**Site**

Land at Afon Lan, Swansea

**Clients**

Wessex Solar Power Limited

**Date**

December 2019

**Planning Authority**

Swansea Council

**Site Centred At**

SN 66007 01137

**Prepared By**

Ben Redclift BA MA PCIfA

**Approved By**

William Bedford BA MCIfA

**Report Status**

Approved

**Orion Ref**

PN2034

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### Timescales Used in This Report

#### Prehistoric

|              |                    |
|--------------|--------------------|
| Palaeolithic | 450,000 -12,000 BC |
| Mesolithic   | 12,000 - 4,000 BC  |
| Neolithic    | 4,000 - 2,200 BC   |
| Bronze Age   | 2,200 - 700 BC     |
| Iron Age     | 700 - AD 43        |

#### Historic

|                      |                    |
|----------------------|--------------------|
| Roman                | 43 - 410AD         |
| Saxon/Early Medieval | 410 - 1066AD       |
| Medieval             | 1066 - 1485AD      |
| Post Medieval        | 1486 - 1901AD      |
| Modern               | 1901 - Present Day |

## Executive Summary

This historic environment desk-based assessment considers land at Afon Lan, Swansea (Figure 1), which is proposed for a solar installation. A review of the available baseline evidence shows that the study site has a low potential to contain remains from all early periods; occupying, as it does, a rural position outside historic settlement.

There is a high potential for Post-Medieval/Modern archaeology to be present within the study site. A small building is depicted in some early OS mapping at the north east corner of the study site, fronting on to Rhyd-y-pandy road and named as 'Penyedw'. Geophysical survey of the study site conducted as part of this assessment has confirmed linear features in this area and traces of this building may be identifiable archaeologically. Extensive drainage features and areas of 'made ground' were also detected, suggesting intense and prolonged landscape management of the site. However any archaeological evidence recovered, if present, is likely to be of limited significance and the available evidence suggests that the majority of the study site remained undeveloped.

It is proposed to install a solar installation, comprising arrays of photovoltaic panels across the study site. The installation would consist of solar photovoltaic (PV) panels with a maximum overall height of 3.5m, an access track into the study site, fencing, security cameras and a number of small buildings to house transformers and other electrical equipment.

The impact of the proposed development on the study site is very limited, comprising a total below ground impact of less than 1% of the study site area. The "H"-piles used results in localised impacts, no large-scale ground reduction or landscaping is planned. Furthermore, some impacts such as for cable trenches and access roads, can also impact buried remains.

While the development proposals have the potential to impact on any sub-surface remains which may survive within the study site, this impact is considered to be minimal.

On this basis, that any potential archaeology within the study site is expected to be of low significance and that the impact of the proposed development will be limited, it is considered that there are no potential archaeological constraints to development of the study site. Should the Local Planning Authority require any further archaeological mitigation measures these could follow planning consent secured by an archaeological planning condition.

## 1.0 Introduction

- 1.1 This archaeological desk-based assessment considers land at Afon Lan, Swansea (Figure 1). It has been researched and prepared by Orion Heritage on behalf of Wessex Solar Power Ltd. The site (hereafter referred to as the 'study site') is located at grid reference SN 66007 01137.
- 1.2 In accordance with Planning Policy Wales and Welsh Office Circular 60/96 'Planning and the Historic Environment: Archaeology' the 'Standard and Guidance for Historic Environment Desk-Based Assessment' (Chartered Institute for Archaeologists 2017), and 'Notes for archaeologists undertaking desk-based studies in South-East Wales' issued by Glamorgan-Gwent Archaeological Trust (GGAT), the assessment draws together available information on designated and non-designated heritage assets, topographic and land-use information so as to establish the potential for non-designated archaeological assets within the study site. The assessment includes the results of a site survey, an examination of published and unpublished records, and charts historic land-use through a map regression exercise. The assessment also considers the setting of heritage assets, and provides an assessment of how their settings contribute to their significance.
- 1.3 The assessment enables relevant parties to assess the significance of heritage/archaeological assets on and close to the study site and considers the potential for hitherto undiscovered archaeological assets, thus enabling potential impacts on assets to be identified along with the need for design, civil engineering or archaeological solutions. It also provides an understanding of any constraints to development of the study site due to the presence of nearby heritage assets, and provides an assessment of the potential impact development would have on the significance of heritage assets and also provides design responses that would serve to reduce that impact in line with local and national policy.
- 1.4 The study area used in this assessment is a 1km radius from the centre of the study site (Figures 2 and 3).

### Location, Topography and Geology

- 1.5 The study site is located west of the Ryhd-y-pandy road to the north of the Afon Lan river, near Swansea/Abertawe, Wales. The study site occupies a slight west facing slope with a height above ordnance datum (aOD) of c.83m at the western study site boundary rising to c.100m at the eastern boundary.
- 1.6 The solid geology of the study site comprises Mudstone, Silstone and Sandstone of the Grovesend formation and Sandstone of the Swansea Member. Superficial deposits consisted of Diamicton of Till and Devensian (Geology of Britain Viewer 2019)

## 2.0 Planning Background and Development Plan Framework

### Ancient Monuments & Archaeological Areas Act 1979

- 2.1 The Ancient Monuments & Archaeological Areas Act 1979 (as amended) protects the fabric of Scheduled Monuments but does not afford statutory protection to their settings.

### Historic Environment (Wales) Act

- 2.2 The Historic Environment (Wales) Act was given Royal Assent in March 2016. This Act provides the legislative framework for managing the historic environment in Wales. Accompanying the Act is new policy and guidance in the form of a Technical Advice Note (TAN) specific to the Historic Environment (see below), and changes to Planning Policy Wales (PPW) Chapter 6 – Conserving the Historic Environment.

### Planning Policy Wales

- 2.3 The Welsh Government has published Planning Policy Wales (PPW), currently updated to Version 10 from December 2018. This sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs). Procedural advice is given in circulars and policy clarification letters.
- 2.4 Section 6.1 of PPW, entitled 'The Historic Environment', provides policy for planning authorities, property owners, developers and others on the conservation and investigation of heritage assets. Section 6.1 sets out the Welsh Governments specific objectives for the historic environment as seeking to:
- protect the Outstanding Universal Value of the World Heritage Sites;
  - conserve archaeological remains, both for their own sake and for their role in education, leisure and the economy;
  - safeguard the character of historic buildings and manage change so that their special architectural and historic interest is preserved;
  - preserve or enhance the character or appearance of conservation areas, whilst the same time helping them remain vibrant and prosperous;
  - preserve the special interest of sites on the register of historic parks and gardens; and
  - protect areas on the register of historic landscapes in Wales.
- Section 6.1 of PPW defines the historic environment as

- 2.5 The historic environment comprises all the surviving physical elements of previous human activity and illustrates how past generations have shaped the world around us.

### Technical Advice Note (TAN) 24: The Historic Environment

- 2.6 The purpose of the TAN is to provide guidance on how the planning system considers the historic environment during development plan preparation and decision making on planning and Listed Building applications. This TAN provides specific guidance on how the following aspects of the historic environment should be considered:
- World Heritage Sites;
  - Scheduled Monuments;

- Archaeological remains;
- Listed Buildings;
- Conservation Areas;
- Historic Parks and Gardens;
- Historic Landscapes; and
- Historic assets of special local interest.

2.7 The following relevant aspects which are covered in detail include:

#### Archaeological Remains

- 2.8 The conservation of archaeological remains is a material consideration in determining a planning application. When considering development proposals that affect Scheduled Monuments or other nationally important archaeological remains, there should be a presumption in favour of their physical preservation in situ. In cases involving less significant archaeological remains, local planning authorities will need to weigh the relative importance of the archaeological remains and their settings against other factors, including the need for the proposed development (TAN 24, 2017).
- 2.9 Where development might reveal, disturb or destroy archaeological remains, including paleoenvironmental evidence, it is important that the opportunities to record archaeological evidence are taken and that archaeological remains are not needlessly destroyed. The ability to record such evidence should not be a factor in deciding whether controlled removal should be permitted.
- 2.10 When considering planning applications that affect known or potential archaeological remains, the local planning authority should consult with their archaeological advisor, about the impact, including the potential scale and harm, of the development on archaeological remains, and/or the adequacy of the mitigation of what has been proposed. These two factors are material considerations in determining the planning application. Where a planning application directly affects a Scheduled Monument and its setting, then the local planning authority is required to consult the Welsh Ministers through Cadw.
- 2.11 The case for the preservation of archaeological remains that are not considered to meet the criteria for national importance, must be assessed on the individual merits of each case. The local planning authority must take into account relevant policies and material considerations and will need to weigh the significance of the remains against the benefits of and need for the proposed development.

#### Conservation Principles for the Sustainable Management of the Historic Environment in Wales 2011

- 2.12 This document provides the basis upon which Cadw discharges certain statutory duties on behalf of the Welsh Ministers. Conservation Principles should be used by others (including owners, developers and other public bodies) to assess the potential impacts of a development proposal on the significance of any historic asset/assets and to assist in decision making where the historic environment is affected by the planning process.
- 2.13 There are six principles:
- Historic assets will be managed to sustain their values;
  - Understanding the significance of historic assets is vital;
  - The historic environment is a shared resource;

- Everyone will be able to participate in sustaining the historic environment;
- Decisions about change must be reasonable, transparent and consistent; and
- Documenting and learning from decisions is essential.

2.14 In considering any planning application for development, the planning authority will be mindful of the framework set by government policy, by current Development Plan Policy and by other material considerations.

### Local Planning Policy

2.15 Planning policy for the study site is provided by The Swansea Local Development Plan (adopted February 2019). This contains the following policy relevant to this assessment:

#### **HC 1: Historic and Cultural Environment**

*The County's distinctive historic and cultural environment will be preserved or enhanced by:*

- Requiring high quality design standards in all development proposals to respond positively to local character and distinctiveness;*
- Identifying and safeguarding heritage assets, sites and their settings;*
- Supporting heritage and cultural led regeneration schemes; iv. Safeguarding and promoting use of the Welsh language.*

### Definitions and Guidance

#### **Definition of the Historic Environment**

2.16 There is no single agreed definition of the historic environment or its components. For the purposes of this assessment, useful definitions are found in the Cadw Conservation Principles for the Sustainable Management of the Historic Environment in Wales (March 2011). In this document, the historic environment is defined as:

*All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried, or submerged, and deliberately planted or managed.*

#### **Heritage Assets**

- 2.17 Heritage assets are defined as an identifiable component of the historic environment. It may consist of or be a combination of an archaeological site, an historic building, or a parcel of historic landscape. Nationally important historic assets will normally be designated (Cadw Conservation Principles).
- 2.18 A useful additional definition is contained within the National Planning Policy Framework (NPPF) for England (2012), which defines 'archaeological interest' as a heritage asset which holds or potentially could hold, evidence of past human activity worthy of expert investigation at some point.
- 2.19 Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
- 2.20 A designated heritage asset is a World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield

or Conservation Area. In Wales, areas of landscape have been designated and included in the non-statutory Register of Landscapes of Historic Interest in Wales.

### Significance

- 2.21 Significance in relation to heritage policy considerations is defined as the sum of the cultural heritage values (Cadw 2011).

### Cadw Setting Guidance

- 2.22 Guidance on setting in Wales is provided by the Cadw Setting of Historic Assets in Wales (2017). This guidance defines setting as follows:

*The setting of a historic asset includes the surroundings in which it is understood, experienced and appreciated, embracing present and past relationships to the surrounding landscape. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive, negative or neutral contribution to the significance of an asset.*

- 2.23 The guidance also provides a four-step process for the assessment of setting:

Stage 1: Identify the historic assets that might be affected by a proposed change or development.

Stage 2: Define and analyse the settings to understand how they contribute to the significance of the historic assets and, in particular, the ways in which the assets are understood, appreciated and experienced.

Stage 3: Evaluate the potential impact of a proposed change or development on that significance.

Stage 4: If necessary, consider options to mitigate or improve the potential impact of a proposed change or development on that significance.

- 2.24 This staged process allows the setting of the historic asset to be understood and for development proposals to be responsive to their settings where potential impacts may occur.

### 3.0 Archaeological and Historic Baseline

#### Archaeological Heritage Assets

- 3.1 The heritage assets under consideration have been identified by means of a review of the following resources:
- Historic Environment Record (HER) Data held by Glamorgan and Gwent Archaeological Trust;
  - The National Monuments Record for Wales
  - Register of Historic Parks and Gardens in Wales
  - Local studies and record office research; and
  - Review of historic mapping.

- 3.2 This resource has been used to provide an understanding of the heritage assets which may be affected by the proposed development. This chapter will describe the heritage assets which may be affected and assess their significance.

- 3.3 Chapter 4 will assess the nature of any effects to those heritage assets by the proposed development.

#### *Previous archaeological investigations*

- 3.4 A geophysical survey of the study site was undertaken by Magnitude Surveys as part of this assessment. The fluxgate gradiometer survey commenced on 18<sup>th</sup> November 2019 and took three days to complete. The surveyor concludes as follows;

*“The geophysical survey has detected a range of different types of anomalies of archaeological, natural and agricultural origin. In the north and south of the survey area, the combination of underlying geology, superficial deposits and topographic variations have contributed to the varying enhancement of the magnetic data, allowing the identification of stronger anomalies related to run-off and colluvial hill washing processes. Modern activity has produced magnetic disturbance at the boundaries of the survey areas, underground services as well as a pylon and associated overhead cables.*

*The archaeological activity was detected to the east of the survey area, consisting of a group of linear features likely related to a post-Medieval farmstead. The second edition OS map identifies a corresponding building and small enclosure within this area.*

*Extensive drainage features have been recorded throughout the survey area, suggesting intense and prolonged landscape management of the site. For example, the hill of ‘made ground’ identified in the central area of the site. Varying strengths of enhancement occur throughout the site, predominantly influenced by both, topographic and geological processes. Further agricultural activity has been identified in the form of mapped and unmapped field boundaries and weak modern ploughing trends”.*

- 3.5 A number of intrusive archaeological investigations have been conducted in the wider study area. These consist of the following;
- (E005663) - In 2007 a watching brief was conducted prior to development of a Felindre Gas Compressor station, c.700m to the west of the study site. No significant archaeological remains were encountered and the lack of pottery evidence indicated that the area had never been intensively farmed.
  - (E003077) – In 2009 Oxford Archaeology were commissioned to undertake a watching brief within the grounds of Morriston Hospital, c.750m to the south of the study site. A linear field boundary and ornamental features relating to the

garden of the former Maes y Gwernen Hall were recorded but no artefacts were recovered.

- (E004136) – In 2013 a geophysical survey took place in advance of a proposed solar park. This took place directly to the north of the study site, c.87m. It was concluded that the impact of the development on archaeological remains would be minimal and that no further works were recommended pre-determination.

3.6 These investigations will be discussed as appropriate in the sections below.

#### *Undated*

3.7 A range of geophysical anomalies were detected across the study site during a geophysical survey conducted as part of this assessment, in November 2019. These have been interpreted as a Post-Medieval farmstead building and features relating to modern agricultural activity.

3.8 No further undated features are recorded in the HER for the study area.

#### *Prehistoric*

3.9 No Prehistoric features were recorded in the HER for the study site or the wider study area, despite a number of archaeological field investigations undertaken. Nor were any features suggestive of remains from this period evident in the geophysical survey of the study site. There is therefore considered to be a low potential for Prehistoric finds or features to be present within the study site.

#### *Roman*

3.10 No Roman features were recorded in the HER for the study site or the wider study area, despite a number of archaeological field investigations undertaken. Nor were any features suggestive of remains from this period evident in the geophysical survey of the study site. There is therefore considered to be a low potential for Roman finds or features to be present within the study site.

#### *Saxon and early Medieval*

3.11 An independent petty kingdom named Glywysing existed in the 6<sup>th</sup> century covering part of the modern county of Glamorgan and said to be named after the 5<sup>th</sup> century king Glywys.

3.12 In the 8<sup>th</sup> century the king Morgan ab Athrwys united the Glywysing with the neighbouring kingdoms of Gwent and Eryng and seems to have conferred his name on the new kingdom Morgannwyg or 'territory of Morgan'. However, the study site was located away from known settlements during this period.

3.13 No Saxon or early Medieval finds or features were recorded in the HER for the study site or the wider study area, despite a number of archaeological field investigations undertaken. Nor were any features suggestive of remains from this period evident in the geophysical survey of the study site. There is therefore considered to be a low potential for Saxon finds or features to be present within the study site.

#### *Medieval*

3.14 Glamorgan was predominantly a rural area in the Medieval period but became a conflict point between the Norman lords and the Welsh princes, resulting in the construction of a number of important castles in the area, such as at Swansea Castle (8km south of the study site) and Neath Castle (9.5km southeast of the study site). However, the study site is at some distance from known Medieval settlement remains in the wider area, and no evidence from this period is noted in the HER.

- 3.15 Furthermore no Medieval features were recorded in the archaeological investigations undertaken in the wider study area or in the geophysical survey of the study site. There is therefore considered to be a low potential for Medieval finds or features to be present within the study site.

#### *Post Medieval/Modern*

- 3.16 After falling under English rule in the 16<sup>th</sup> century Glamorgan became increasingly stable and, with its important mineral deposits, the most populous and industrialised county in Wales during the 19<sup>th</sup> century.
- 3.17 The Historic Environment Record for the study area represents a predominantly rural landscape although industrial processes were also taking place. Post-Medieval farmsteads surround the study site in all directions. Cefn-betingau farm lies c.200m to the north of the study site (GGAT08516w) and Geli-wasted Farm is c.740m to the east of the study site (GGAT08538w). Approximately 580m to the south east of the study site is Cefn-felindre farm (GGAT08537w), c.300m to the south is Dorglwyd Farm (GGAT08536w) and c.660m to the north west of the study site is Aber-gelli-fawr farm (GGAT08515w). Maes Eglwys is a 17<sup>th</sup> end-entry farmhouse with adjacent bakehouse and corn-drying kiln, is present c.540m to the south west of the study site (GGAT01005w). Most of these buildings are depicted on the 1813 OS drawing of Swansea. The study site remains undeveloped on this map (Fig.4)
- 3.18 A number of Mills are recorded in the Historic Environment Record data for the study area, some of which have been identified through historic mapping. Approximately c.80m to the south of the eastern corner of the study site lies Y Felin Wen (GGAT01527w). This is shown as a flour mill on the OS 3<sup>rd</sup> edition map. To the east of the study site, 500m away, is Pan Yr Uchedydd Farm comprising a Post-Medieval mill complex with the farmstead still in agricultural use (GGAT02386w). A millrace for Y Felin Wen Mill of the same date has been identified, c.820m to the north east of the study site (GGAT06962w). This is still visible on mapping of 2012.
- 3.19 Documentary evidence attests to a turnpike gate at 'Rhyd-y-pandy'. A milestone observed in 1981 may have been related to the turnpike road, c.630m to the north east of the study site (GGAT01286w).
- 3.20 The 1841 Tithe map for the parish of Llangevelach (Fig.5) depicts the study site occupying parts of land parcels 1698, 1699, 1700, 1701, 1704, 1705, 1706, 1707, 1709, 1710, 1711. A small building seems to be shown at the north east corner of the study site, fronting on to Rhyd-y-pandy road and named as 'Penyedw'. This appears to be present on the OS map of 1900 (Fig.6) and 1921 (Fig.7) but is absent from the OS map dated 1935-1936 (Fig.8).
- 3.21 Historic mapping for the study area highlights little development to the study site during the 20<sup>th</sup> century. The greatest changes occurring between 1951 and 1953 with the construction of Morriston Hospital, c.800m to the south of the study site (Fig.9). A number of field boundaries have also been removed within the study site during this period.
- 3.22 Further development has taken place at Morriston Hospital by 1999 and the addition of a building at Cefn-betingau farm c.200m to the north of the study site (Fig.10).
- 3.23 By 2006 (Fig.11) a track has been laid out from Abergelli Farm, c.700m to the north west of the study site, running against the western study site boundary before continuing to the south. The building labelled Pant-y-gelynen to the east of Rhyd-y-pandy road and south of Felin Wen Farm has now been built.

- 3.24 The 2019 map (Fig.12) is the first to denote the presence of Cefn-betingau solar farm directly to the north west of the study site and there has been considerable further development at Pant-lasau approximately 870m to the south of the study site. Felindre Gas Compressor station has now been constructed in the area of Aber-gelli-fach plantation, c.500m to the west of the study site.
- 3.25 The available evidence indicates a known potential for Post-Medieval/Modern archaeology to be present within the study site. A small building is depicted in some early OS mapping at the north east corner of the study site, fronting on to Rhyd-y-pandy road and named as 'Penyedw'. Geophysical survey of the study site conducted as part of this assessment has confirmed linear features in this area and traces of this building may be identifiable archaeologically. Extensive drainage features and areas of 'made ground' were also detected, suggesting intense and prolonged landscape management of the site.

*Summary of Archaeological Potential and Assessment of Significance*

- 3.26 A review of the available baseline evidence shows that the study site has a low potential to contain remains of all early periods; occupying, as it does, a rural position outside historic settlement.
- 3.27 There is a known potential for Post-Medieval/Modern archaeology to be present within the study site. A small building is depicted in some early OS mapping at the north east corner of the study site, fronting on to Rhyd-y-pandy road and named as 'Penyedw'; this was demolished by the mid-1930s (Fig, 8). Geophysical survey of the study site conducted as part of this assessment has confirmed linear features in this area and traces of this building may be identifiable archaeologically. Extensive drainage features and areas of 'made ground' were also detected, suggesting intense and prolonged landscape management of the site. However any archaeological evidence recovered, if present, is likely to be of limited significance and the majority of the site appears to have remained undeveloped in recent times.

## 4.0 Proposed Development and Potential Impact on Heritage Assets

### The Proposed Development

- 4.1 The study site comprises 7 fully enclosed fields set to pasture, totalling an area of approximately 14.2ha (see Fig. 1).
- 4.2 It is proposed to install a solar installation of 5mw capacity, comprising arrays of photovoltaic panels across the study site. The installation would consist of solar photovoltaic (PV) panels with a maximum overall height of 3.5m, an access track into the study site, fencing, security cameras and a number of small buildings to house transformers and other electrical equipment.
- 4.3 The panels would be mounted on small piled foundations which would be driven to the ground. On average the piled foundations for the solar arrays would be driven approximately 1.5m into the ground and each pile would measure no more than 0.01m<sup>2</sup> in area.
- 4.1 Foundations for the transformers, substation, switchgear and batter are understood to be minimal (technical information is provided separately in the technical drawing pack).
- 4.2 No large-scale ground reduction or landscaping is planned for the development.

### Potential Physical Archaeological Impacts and Mitigation Measures

- 4.3 The impact of the proposed development on the study site is very limited, comprising a total below ground impact of less than 1% of the study site area. The “H”-piles used results in localised impacts, no large-scale ground reduction or landscaping is planned. Furthermore, some impacts such as for cable trenches and access roads, can also impact buried remains.
- 4.4 While the development proposals have the potential to impact on any sub-surface remains which may survive within the study site, this impact is considered to be minimal.

## 5.0 Summary and Conclusions

- 5.1 This historic environment desk-based assessment considers land at Afon Lan, Swansea (Figure 1), which is proposed for a solar installation. A review of the available baseline evidence shows that the study site has a low potential to contain remains from all early periods; occupying, as it does, a rural position outside historic settlement.
- 5.2 There is a high potential for Post-Medieval/Modern archaeology to be present within the study site. A small building is depicted in some early OS mapping at the north east corner of the study site, fronting on to Rhyd-y-pandy road and named as 'Penyedw'. Geophysical survey of the study site conducted as part of this assessment has confirmed linear features in this area and traces of this building may be identifiable archaeologically. Extensive drainage features and areas of 'made ground' were also detected, suggesting intense and prolonged landscape management of the site. However any archaeological evidence recovered, if present, is likely to be of limited significance and the majority of the site appears to have remained undeveloped in recent times.
- 5.3 It is proposed to install a solar installation, comprising arrays of photovoltaic panels across the study site. The installation would consist of solar photovoltaic (PV) panels with a maximum overall height of 3.5m, an access track into the study site, fencing, security cameras and a number of small buildings to house transformers and other electrical equipment.
- 5.4 The impact of the proposed development on the study site is very limited, comprising a total below ground impact of less than 1% of the study site area. The "H"-piles used results in localised impacts, no large-scale ground reduction or landscaping is planned. Furthermore, some impacts such as for cable trenches and access roads, can also impact buried remains.
- 5.5 While the development proposals have the potential to impact on any sub-surface remains which may survive within the study site, this impact is considered to be minimal.
- 5.6 On this basis, that any potential archaeology within the study site is expected to be of low significance and that the impact of the proposed development will be limited, it is considered that there are no potential archaeological constraints to development of the study site. Should the Local Planning Authority require any further archaeological mitigation measures these could follow planning consent and be secured by an archaeological planning condition.

## Sources

### General

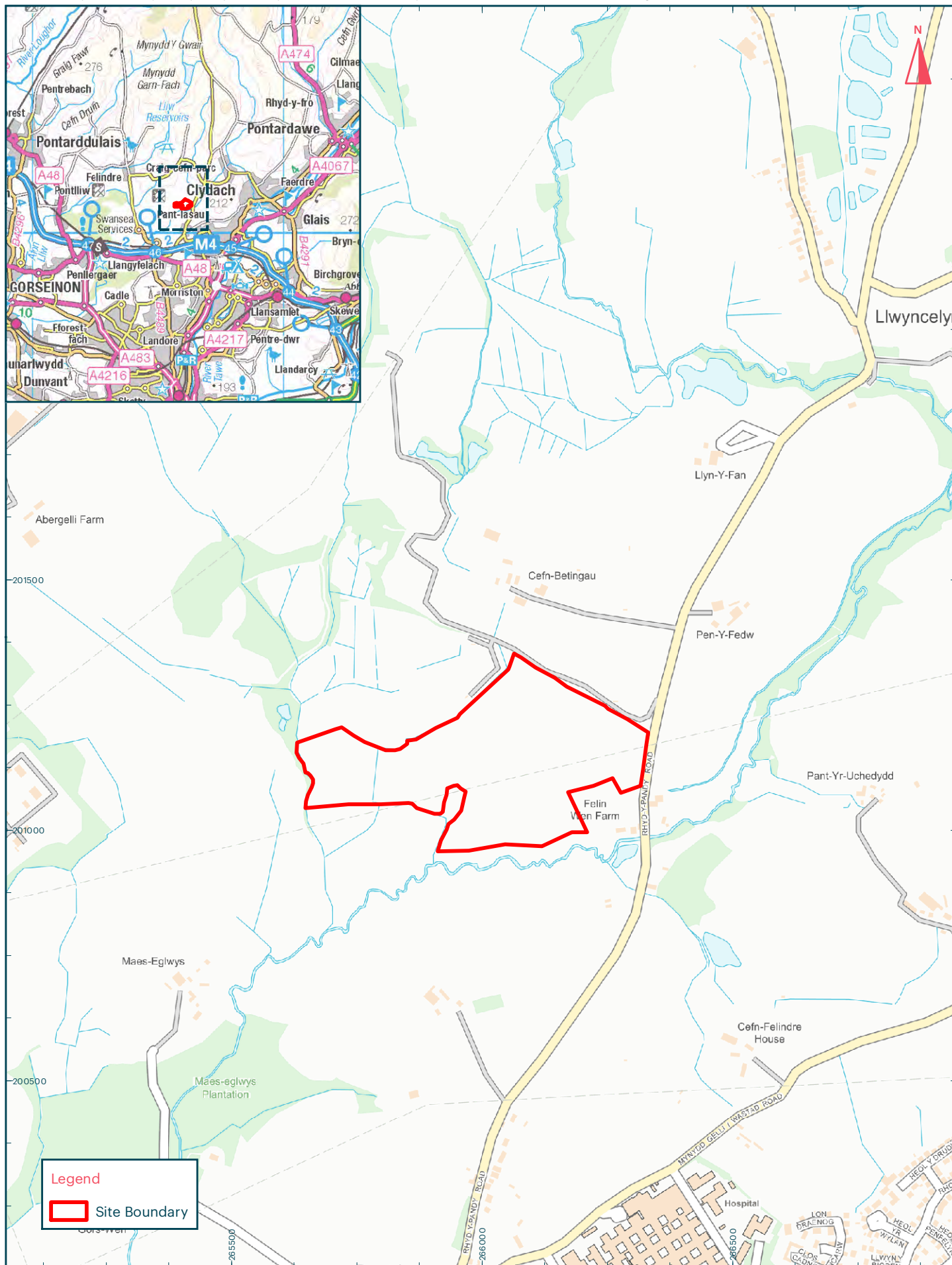
Glamorgan and Gwent Archaeological Trust Historic Environment Record (HER)  
National Monuments Record for Wales  
Register of Historic Parks and Gardens in Wales  
TAN 24

### Websites

Archaeological Data Service – [www.ads.ahds.ac.uk](http://www.ads.ahds.ac.uk)  
British History Online – <http://www.british-history.ac.uk/>  
British Geological Society Geology of Britain Viewer -  
<http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>  
Heritage Gateway - [www.heritagegateway.org.uk](http://www.heritagegateway.org.uk)  
MAGIC - [www.magic.gov.uk](http://www.magic.gov.uk)

### Bibliographic

Cadw 2011. Conservation Principles for the Sustainable Management of the Historic Environment in Wales  
Cadw 2017. Setting of Historic Assets in Wales



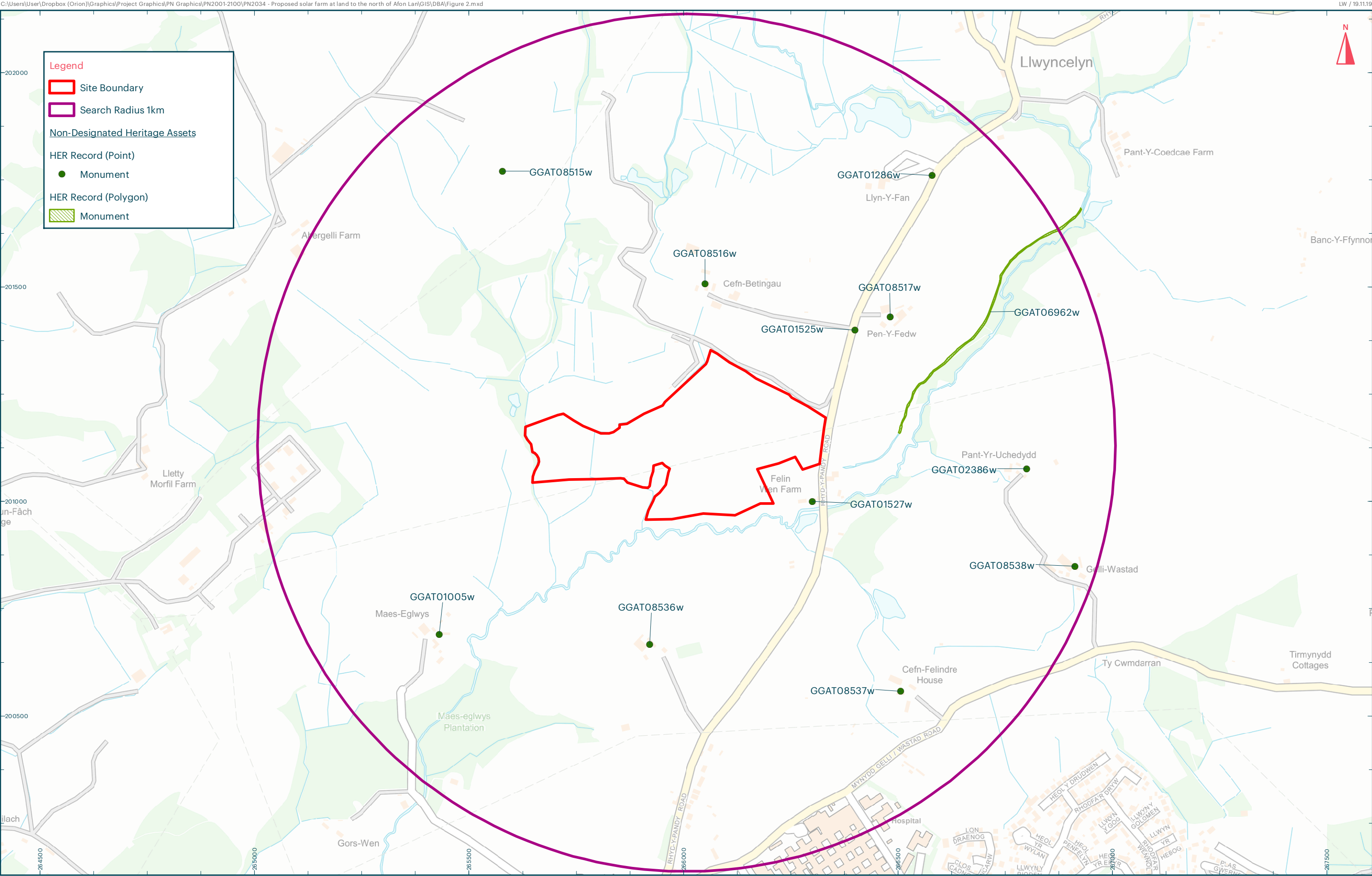
**Title:**  
Figure 1: Site Location

**Address:**  
Proposed solar farm at land to the north of Afon Lan

Scale at A4: 1:10,000

0 300m

**orion.**

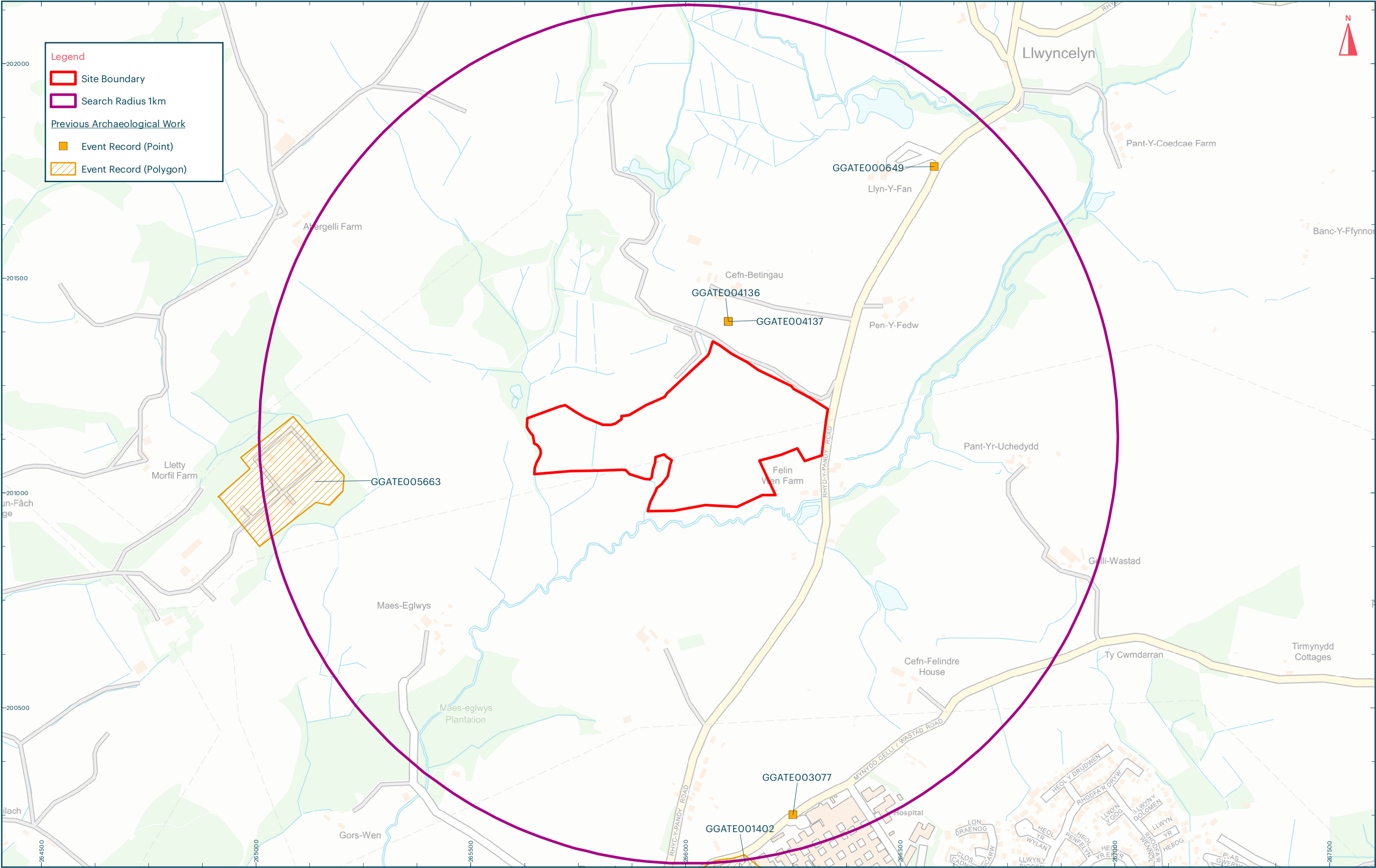


**Title:**  
Figure 2: HER data plot – Monuments

**Address:**  
Proposed solar farm at land to the north of Afon Lan

Scale at A3: 1:8,000





**Title:**  
Figure 3: HER data plot – Events

**Address:**  
Proposed solar farm at land to the north of Afon Lan

Scale at A3: 1:8,000





|                                                                                                                                                            |                                            |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--|
| <p><b>Title:</b><br/>Figure 4: 1813 Ordnance Surveyor Drawing, Swansea</p> <p><b>Address:</b><br/>Proposed solar farm at land to the north of Afon Lan</p> | <p>Scale at A4: 1:10,000</p> <p>0 300m</p> |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--|

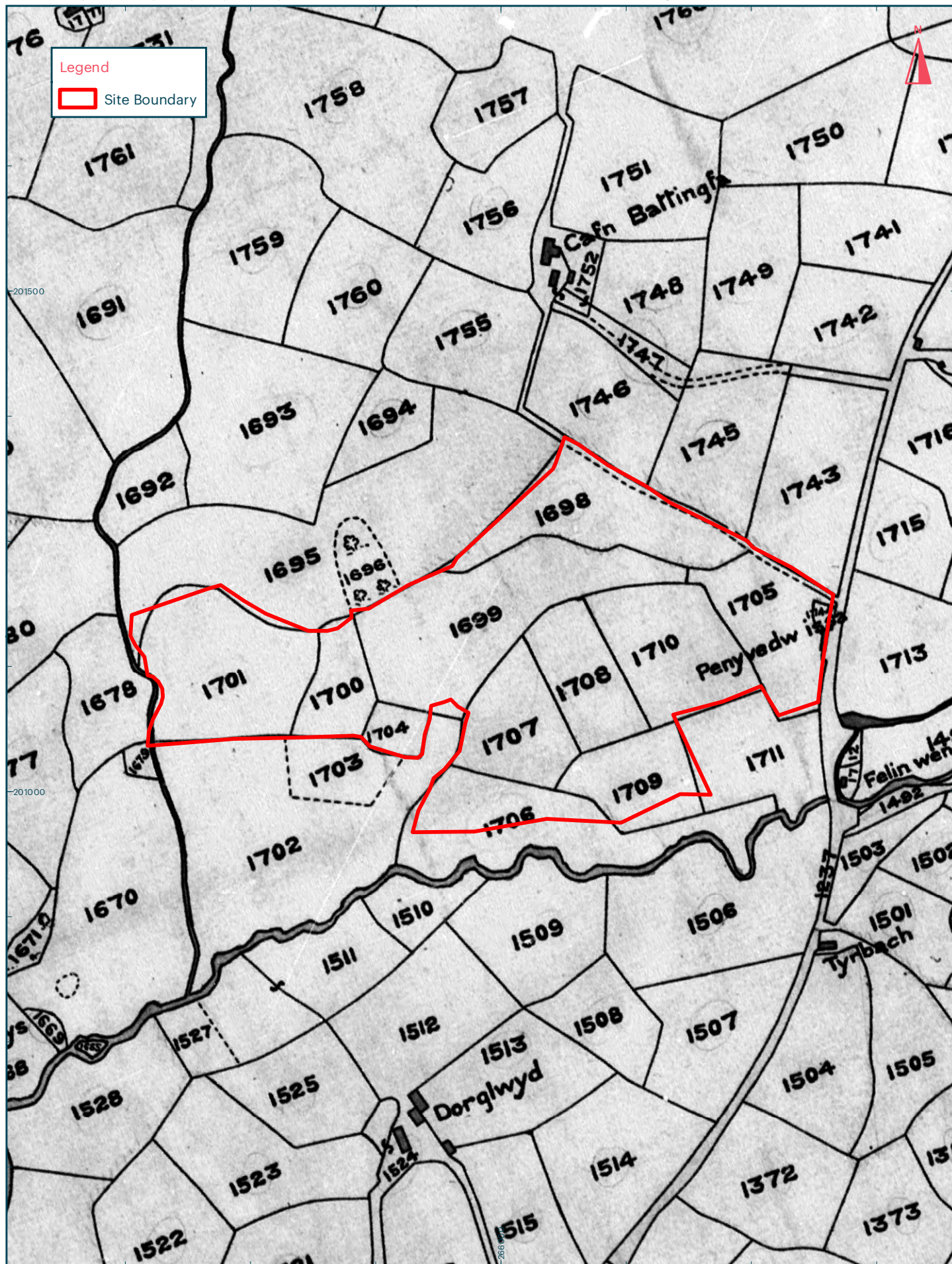
**Title:**

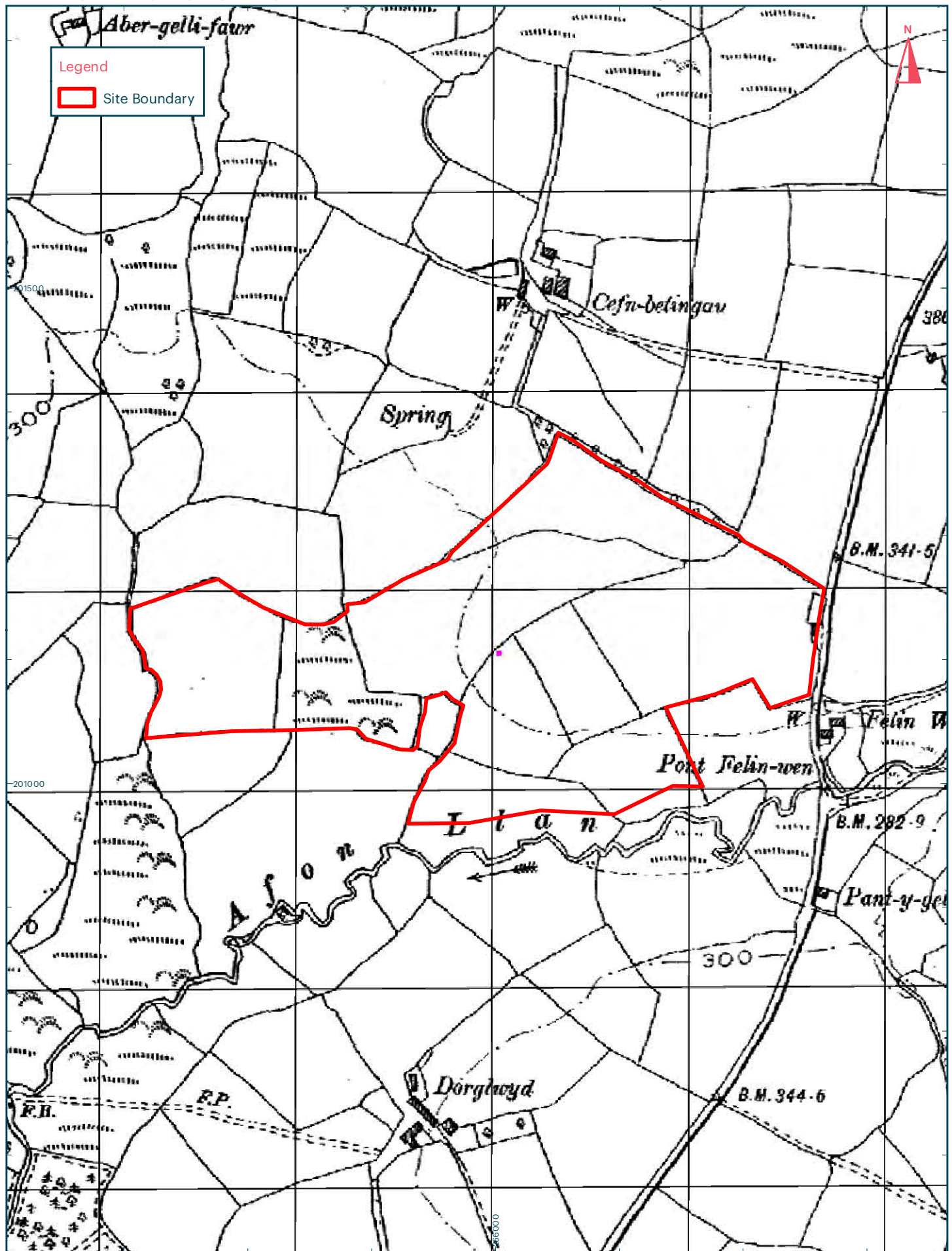
Figure 5: 1841 Tithe map for the parish of Llangyvelach

**Address:**

Proposed solar farm at land to the north of Afon Lan

Scale at A4: 1:5,000

**orion.**



**Title:**  
Figure 6: 1900 OS map; 1:10,560 scale

**Address:**  
Proposed solar farm at land to the north of Afon Lan

Scale at A4: 1:5,000



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