

ENVIRONMENTAL STATEMENT:  
VOLUME 1  
OAKLANDS SOLAR FARM AND BATTERY ENERGY  
STORAGE SYSTEM

LAND OFF FIVE MILE LANE | NEAR BONVILSTON | VALE OF GLAMORGAN



**PREPARED BY**



**PREPARED FOR**



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# 1. INTRODUCTION

## 1.1 SUMMARY OF SITE AND PROPOSAL

- 1.1.1 This Environmental Statement (ES) has been prepared on behalf of Sirius Renewable Energy (the “Applicant”) to accompany a planning application for the construction, operation and decommissioning of a Solar Farm and Battery Energy Storage System (BESS) across a total area of approximately 127ha. The proposed development encompasses three parcels of land (known as Development Areas) which are located to the east and west of A4226 (Five Mile Lane), approximately 750m to the south of the villages of Bonvilston and St Nicholas. The Application Site lies c. 12km to the west of Cardiff and is situated within the administrative area of the Vale of Glamorgan in South Wales.
- 1.1.2 The majority of the site to the west of Five Mile Lane is allocated under Policy MG30 of the Vale of Glamorgan Local Development Plan as a "Local Search Area for Solar Energy".
- 1.1.3 Drawing No. **SRE1113/02/01** (Doc Ref. 2.01) identifies the site location.
- 1.1.4 Oaklands solar farm will have an export capacity of circa 50MW of electricity, enough to power nearly 20,400 homes per year and offset approximately 20,200 tonnes of CO2 every year, the equivalent of taking over 5,000 petrol / diesel cars off the road<sup>1</sup>.
- 1.1.5 The Battery Energy Storage System (BESS) will have a capacity to charge, store and export up to 50MVA of electricity to the local distribution network. The BESS will deliver significant environmental benefits, enabling technology for renewable generation, replacing the required for gas fired power generation and providing rapid response power to satisfy peak demand. In performing these roles the development has the ability to reduce carbon dioxide emissions by over 20,600 metric tonnes annually whilst also providing electricity storage equivalent to supplying over 20,800 homes<sup>2</sup>.

## 1.2 PLANNING APPROACH

- 1.2.1 As the scheme comprises an electricity generating station with a generating capacity between 10MW and 350MW, it falls within the definition of a ‘Development of National Significance’ (DNS) under section 4 of the Developments of National Significance (Specified Criteria and Prescribed Secondary Consents) (Wales) Regulations 2016<sup>3</sup>, for the purposes of section 62 (D) of the Town & Country Planning Act 1990 as amended by s19 of the Planning (Wales) Act 2015<sup>4</sup> (“the Welsh Act”).
- 1.2.2 Part 5 of the Planning (Wales) Act 2015 set out DNS as a new category of planning application. The Provisions in the Act came into force in March 2016 and require PEDW to manage the DNS process on behalf of the Welsh Government. Future Wales: The National Plan 2040 (February 2021) is the development plan for DNS decision-making purposes. The Act requires the applicant to carry out pre-application consultation before submitting the planning application to PINS. The purpose of the DNS process is to ensure timely decisions are made on those planning applications that are of greatest significance to Wales because of their potential benefits and impacts.

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<sup>1</sup> Internal calculations using OFGEM Typical Domestic Consumption Values and BEIS Carbon Conversion Factors

<sup>2</sup> Internal calculations using OFGEM Typical Domestic Consumption Values and BEIS Carbon Conversion Factors

<sup>3</sup> 2016 No. 53 (W.23)

<sup>4</sup> 2015 anaw 4

**1.3 REQUIREMENT FOR AN ENVIRONMENTAL IMPACT ASSESSMENT**

- 1.3.1 The development falls within Category 3 of Schedule 2, ‘Energy industry’, sub-section (a) ‘industrial installations for the production of electricity, steam and hot water (unless included in Schedule 1). The applicable threshold for Environmental Impact Assessments (EIA) development exceeds 0.5 hectares, and, as such, the Local Planning Authority must screen the proposal (by the criteria listed in Schedule 3) to ascertain whether there are likely to be the potential for likely significant effects on the environment.
- 1.3.2 Sirius Renewable Energy requested a screening direction from the Planning Inspectorate on 10<sup>th</sup> December 2019 who deemed the proposal EIA development on 13<sup>th</sup> February 2020 (copy included in **Appendix 1.1**, Doc Ref. 4.01.1).
- 1.3.3 An Environmental Statement (ES) is a document which presents the results of the detailed assessment of the potential beneficial or adverse environmental effects and impacts arising from the construction, operation and decommissioning phases of the proposed development. The ES must contain information specified in EIA Regulation 2 (1) and Schedule 4.

**1.4 REQUEST FOR A SCOPING DIRECTION**

- 1.4.1 In May 2021, Sirius Renewable Energy submitted a request for a formal Scoping Direction from PEDW under Regulation 33 of the EIA Regulations. The purpose of the request for a Scoping Direction is to:
  - Define the Environmental Statement (ES) which will accompany the planning application;
  - Anticipate and so allow potentially adverse environmental impacts to be considered at an early stage;
  - Define methodologies to be used in the EIA process to assess the effects of the proposal; and
  - Engage relevant stakeholders at an early stage of the proposals to enable contribution of relevant information.
- 1.4.2 PEDW issued a Scoping Direction on 28<sup>th</sup> July 2021 (copy included in **Appendix 1.2**, Doc Ref. 4.01.2). **Table 1.1** below summarises the environmental topics scoped in and out of the EIA.

**Table 1.1: Summary of Environmental Topics to be Considered by the EIA**

Scoped In Environmental Topic	Scoped Out Environmental Topics
Landscape and Visual Impact	Glint and Glare
Ecology and Nature Conservation	Soils, Geology and Agricultural Land
Historic Environment	Socio Economic
Noise and Vibration	
Climate Change	
Hydrology, Flood Consequences and Drainage	
Traffic and Transport (in relation to the construction and decommissioning phases)	
Air Quality (in relation to the construction and decommissioning phases)	
Major Accidents and/or Disasters	

Human Health	
Cumulative Impacts	

## 1.5 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

- 1.5.1 There is no statutory requirement regarding the form an ES must take, as this is dependent upon the nature of the development under consideration and the sensitivity of the baseline environment. The EIA Regulations set out the minimum information to be included in an ES, within Regulation 17(3) and Schedule 4.
- 1.5.2 Furthermore, Appendix 3 of Guidance on Developments of National Significance<sup>5</sup> provides advice on the implementation of the EIA Regulations and summarises the information to be included in an ES. **Table 1.2** identifies the locations within this ES where the information required for inclusion within an ES in accordance with EIA Regulations 2017: Schedule 4 can be found.

**Table 1.2: Information for Inclusion in Environmental Statements**

Required Environmental Information	Document that Contains the Information
1. Description of the development, including in particular –	
(a) a description of the location of the development;	Environmental Statement Vol. 1, Chapter 2
(b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works and the land-use requirements during the construction and operational phases;	Environmental Statement Vol. 1, Chapter 3
(c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;	Environmental Statement Vol. 1, Chapter 3
(d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, oil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operational phases.	Environmental Statement Vol. 1, Chapters 7 to 14. Supporting technical reporting in Environmental Statement Vol 2. Chapters 7 to 14

<sup>5</sup> <https://gov.wales/topics/planning/developcontrol/developments-of-national-significance/guidance/?lang=en>

<p>2. A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the applicant or appellant which are relevant to the proposed development and its specific characteristics and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.</p>	<p>Environmental Statement Vol. 1, Chapter 5</p>
<p>3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.</p>	<p>Environmental Statement Vol. 1, Chapters 7 to 14. Supporting technical reporting in Environmental Statement Vol 2. Chapters 7 to 14.</p>
<p>4. A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaption), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.</p>	<p>Environmental Statement Vol. 1, Chapters 7 to 14. Supporting technical reporting in Environmental Statement Vol 2. Chapters 7 to 14.</p>
<p>5. A description of the likely significant effects of the development on the environment resulting from, inter alia –</p> <p>(a) the construction and existence of the development, including, where relevant, demolition works;</p> <p>(b) the use of natural resources in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;</p>	<p>Environmental Statement Vol. 1, Chapters 7 to 14.</p> <p>Environmental Statement Vol. 1, Chapters 7 to 14.</p> <p>Environmental Statement Vol. 1,</p>

<p>(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances and the disposal and recovery of waste;</p> <p>(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);</p> <p>(e) the cumulation of effects with other existing and / or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;</p> <p>(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;</p> <p>(g) the technologies and the substances used.</p> <p>The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at European Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC and Directive 2009/147/EC</p>	<p>Chapters 7 to 14.</p> <p>Environmental Statement Vol. 1, Chapters 7 to 14.</p> <p>Environmental Statement Vol. 1, Chapters 7 to 14.</p> <p>Environmental Statement Vol. 1, Chapters 7 to 14.</p> <p>Environmental Statement Vol. 1, Chapters 3, 7 to 14.</p>
<p>6. A description of the forecasting methods or evidence used to identify and assess the effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved</p>	<p>Environmental Statement Vol. 1, Chapters 7 to 14.</p>



<p>7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced, or offset, and should cover both the construction and operational phases.</p>	<p>Environmental Statement Vol. 1, Chapters 7 to 14.</p>
<p>8. A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of the Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.</p>	<p>Environmental Statement Vol. 1, Chapter 6</p>
<p>9. A Non-Technical Summary (NTS) of the information provided under paragraphs 1 to 8</p>	<p>Environmental Statement Vol. 3, Non-Technical Summary.</p>
<p>10. A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.</p>	<p>Environmental Statement Vol. 1, Chapters 7 to 14.</p>

- 1.5.3 Information has been gathered for each environmental subject matter area. This ensures that a comprehensive technical assessment of the potentially significant effects of the proposed development has been undertaken.
- 1.5.4 Each of the technical assessments will consider:
- **Context:** This sets out the relevance of each environmental topic in both planning and technical terms, including an explanation of the terminology to be used;
  - **Proposed Development:** This outlines the proposed development focussing on aspects pertinent to the topic chapter;
  - **Assessment Approach:** This includes details of the initial data gathering undertaken for the scoping exercise and how this has influenced the scope of the assessment;
  - **Baseline Conditions:** It describes baseline environmental conditions relating to the environmental topic and the identification of potentially sensitive receptors;
  - **Assessment of Effects:** This outlines how data has been collected and the method used to identify any potentially significant effects. It concludes by predicting the effects of the proposed development and their significance;
  - **Proposed Mitigation:** This outlines the measures that have been incorporated into the proposed development to reduce and minimise the environmental effects;
  - **Cumulative Effects:** Assess the potential for likely significant cumulative effects as a result of committed and reasonably foreseeable developments within an identified study area;
  - **Summary of Predicted Effects:** This brings all of the effects, both adverse (negative) and beneficial (positive) together in tabular form and summarises the findings using defined and consistently applied criteria;
  - **Implementation of Mitigation:** This section summarises the mitigation measures that will form part of the development proposals and who will be responsible for their implementation. It also states how measures will be monitored where appropriate;
  - **Residual Impacts:** This section identifies that impacts that potentially remain following implementation of the mitigation. Residual impacts should not lead to any significantly adverse effects on identified receptors, equally residual impact may have positive effects.
  - **Summary and Conclusions**
- 1.5.5 The purpose of the Environmental Impact Assessment is to identify the likely 'significance' of environmental effects (beneficial or adverse) arising from a development. In broad terms, environmental effects are described as:
- Adverse – detrimental or negative effects to an environmental resource or receptor;
  - Beneficial – advantageous or positive effect to an environmental resource or receptor; or
  - Negligible – a neutral effect to an environmental resource or receptor.
- 1.5.6 Effects are assessed in terms of:
- The magnitude of the impact –the degree of alteration (both positive and negative) from the baseline state; and
  - The sensitivity of the receptor(s) subjected to the impact –this may relate to the value of a resource and the reversibility of impacts.
- 1.5.7 Significance of effect is evaluated as a combination of the sensitivity of the receptor

and the magnitude of change the development results in. Although the matrix in **Table 1.3** is designed to demonstrate an objective rationale to reach a conclusion about the potential significance of impact, a degree of professional judgement is a key element in the evaluation process.

**Table 1.3: Significance of Effects**

		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Magnitude of Effect	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor/Moderate	Negligible
	Low	Moderate	Minor/Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

- 1.5.8 Any effect of Moderate or Major significance is considered to represent a likely significant effect for the purposes of the EIA Regulations. Significance of effects would be considered before and after mitigation.
- 1.5.9 The criteria for determining magnitude of impact is set out below in **Table 1.4**.

**Table 1.4: Magnitude of Effects and Criteria**

Magnitude of Effect	Criteria
High	Total loss or major/substantial alteration to elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.
Medium	Loss or alteration to one or more elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.
Low	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but the underlying character/composition/attributes of the baseline condition will be similar to the pre-development.
Negligible	Very little change from baseline conditions. Change not material, barely distinguishable or indistinguishable, approximating to a 'no change' situation.

- 1.5.10 The sensitivity of a receptor is based on the importance of the receptor using the criteria below in **Table 1.5**.

**Table 1.5: Degree of Sensitivity Criteria**

Sensitivity	Criteria
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character or is of international or national importance.

Medium	The receptor/resource has moderate capacity to absorb change without significantly altering its present character or is of high and more than local (but not national or international) importance.
Low	The receptor/resource is tolerant of change without detrimental effect, is of low or local importance.
Negligible	The receptor/resource can accommodate change without material effect, is of limited importance.

**1.6 FORMAT OF THE ENVIRONMENTAL STATEMENT**

1.6.1 The required information will be incorporated into an Environmental Statement which will be presented in 3 volumes:

- ES Volume 1 - Environmental Statement;
- ES Volume 2 - Appendices and Annexes of Technical Reports, Plans and Photographs; and
- ES Volume 3 - Non-Technical Summary.

**Environmental Statement - Volume 1**

1.6.2 The introductory chapters of the ES set out the main characteristics of the site and its surroundings, and outline the proposed development, methodology of assessment and scope of the Environmental Statement.

1.6.3 Schedule 4 of the Environmental Impact Assessment Regulations 2017, requires a description of the likely significant impacts, direct and indirect, on the environment, explained by reference to its possible impact on:

- the construction and existence of the development, including, where relevant, demolition works;
- the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;
- the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;
- the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);
- the culmination of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;
- the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; and
- the technologies and the substances used.

1.6.4 For the purposes of the Environmental Statement and subject to the Scoping Direction (where non-relevant environmental topics have been ‘scoped out’) the assessments have been grouped into topic areas as set out below:

Introduction	Outline of Planning Application Purpose of ES Requirement for an ES Format of ES
The Site	Site and Environs Site Access Site History
The Development	Introduction

	Background Proposal Description
Summary of Relevant Planning Policy	National Planning Policy Local Plan Material Considerations
Need and Alternatives	Alternative Options and Scenarios
Environmental Topics Scoped Out	Soils, Geology and Agricultural Land Glint and Glare Socio Economic Justification provided for the environmental topic areas scoped out
Scoped in Assessments	Landscape and Visual Impact Noise and Vibration Historic Environment Hydrology, Hydrogeology and Drainage Ecology and Nature Conservation Traffic and Transportation Climate Change Major Accidents and / or Disasters Public Health and Wellbeing Air Quality Cumulative Impacts
Conclusions	

1.6.5 Of the above environmental topics Agricultural Land Quality and Glint and Glare, will have separate standalone technical statements which have been submitted with the application.

**Environmental Statement - Volume 2**

1.6.6 Each subject considered will be supported, where necessary, by detailed technical reports that will form appendices to the main ES document in Volume 1.

**Non-Technical Summary – Volume 3**

1.6.7 The Non-Technical Summary (NTS) provides summary information about the proposal and its likely environmental effects. It is written for the non-specialist reader and provides a summary overview of the environmental impact assessment. It is proposed that the NTS adopts the following format:

- Summary
- Introduction
- Site and Surroundings
- Descriptions and Proposals
- Summary of main topic areas and predicted environmental effects
- Summary and Conclusions

**1.7 COMPETENT EXPERTS**

1.7.1 Following pre-application discussions, a project team was assembled to carry out the assessments within the EIA process. The EIA has been undertaken by a team of environmental consultants with expertise in their relevant disciplines. EIA coordination and preparation of the ES has been undertaken by Sirius Planning Ltd. In compliance with Regulation 18(5), the consultants involved in undertaking the EIA are listed below in **Table 1.6**, by EIA topic responsibility and details of their qualifications.

**Table 1.6: Competent Experts**

EIA Topic	Name	Company	Qualifications
Planning Policy	Francesca Wray	Sirius Planning Ltd	MRTPI
Alternatives	Francesca Wray	Sirius Planning Ltd	MRTPI
Landscape and Visual Impact	Alex Stappard	Sirius Planning Ltd	CMLI
Ecology and Nature Conservation	Adam Day	FPCR Environment and Design Ltd	BSc (Hons), MSc ACIEEM
Historic Environment	Charlotte James-Martin	Archaeology Wales	BA (Hons), MCifA
Noise and Vibration	Dean Kettlewell	NVC Ltd	MSc MAE MIOA I.Eng
Climate Change	Dan Elvin	Sirius Planning Ltd	MRTPI
Hydrology, Hydrogeology and Drainage	Keelan Serjeant	KRS Environmental	BSc (Hons), MSc, MCIWEM
Traffic and Transport	Carly Pulling	Sanderson Associates	BSc (Hons), EngTech MIHE
Cumulative	Dan Elvin	Sirius Planning Ltd	MRTPI

## 1.8 STAKEHOLDER CONSULTATION

- 1.8.1 DNS guidance strongly advises early engagement with stakeholders prior to the submission of an application. There is also a statutory requirement for a 6-week period of pre-application consultation in advance of the planning application being submitted to PEDW for acceptance. Sirius Renewable Energy has implemented an expansive programme of consultation throughout the EIA process starting with non-statutory pre-application discussions in November 2018 and the formal pre-application consultation in September 2022.

## 1.9 OBTAINING INFORMATION

- 1.9.1 Electronic copies of all documents submitted to PEDW in respect of the planning application are available at the following website:

<https://www.oaklands-solar.co.uk/>

- 1.9.2 Paper format copies of the planning application and supporting information are available on request at the following prices:

Full Hard Copy - £175

CD Copy - £25

- 1.9.3 All requests for hard copy information should be addressed to the following:

Sirius Planning

4245 Park Approach  
Thorpe Park  
Leeds  
LS15 8GB



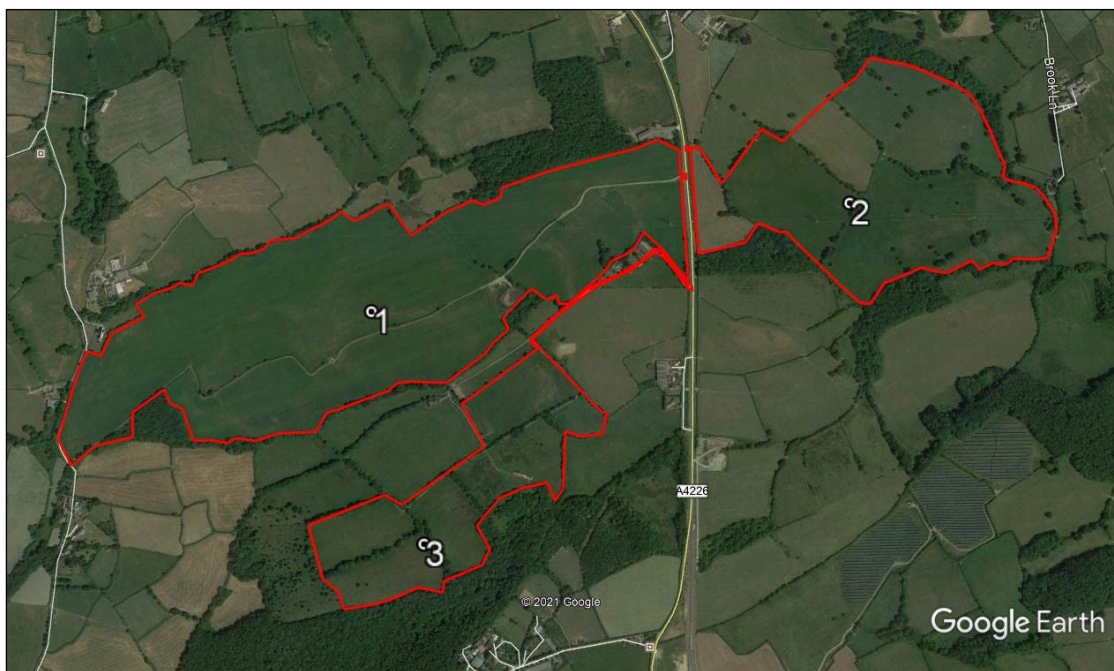
## **2. THE SITE AND SURROUNDINGS**



## 2.1 INTRODUCTION

- 2.1.1 This chapter provides a description of the site in terms of its location, history, and surrounding land uses. It also sets the development within the context of surrounding land uses.
- 2.1.2 The proposal site is split into three Development Areas (DA's), two are located to the west and one east of A4226 (Five Mile Lane), approximately 750m to the south of the village Bonvilston and approximately 950m to the south-west of the village St Nicholas. The Application Site lies c. 12km to the west of Cardiff and is situated within the administrative area of The Vale of Glamorgan in South Wales.
- 2.1.3 The majority of the site to the west of Five Mile Lane is allocated under Policy MG30 of the Vale of Glamorgan Local Development Plan as a "Local Search Area for Solar Energy"
- 2.1.4 The site location and extent of site boundaries are shown in Drawing No. **SRE1113/02/01** (Doc Ref. 2.01) and below in **Figure 2.1**. Cumulatively the identified deployment areas cover approximately 127ha.

**Figure 2.1: Site Location**



## 2.2 SITE DESCRIPTION

- 2.2.1 The site and surrounding areas are rural in nature, characterised by farmland, rough scrubland and bounded by woodlands to the south of the site. The majority of the site is relatively flat, with the exception of the north-west which falls away to the north and the western area of deployment area one that falls away to the west.
- 2.2.2 The site is split into three by the A4226, one parcel to the east and two to the west:
- Development Area 1 (Pancross) – 66ha
  - Development Area 2 (Redlands) – 40ha
  - Development Area 3 (Oaklands) – 21ha

- 2.2.3 The majority of the site comprises agricultural fields of varying size enclosed by large hedgerows or tree belts and assessed to be Grade 3b or lower in terms of Agricultural Land Quality. None of the land within the application area is Best and Most Versatile agricultural land.
- 2.2.4 Along the western boundary of the site is an unnamed lane. Several farms are located adjacent to the northern and southern site boundaries. To the east of the A4226, approximately 500m to the south of the site is a 6MWp solar farm that has been operational since 2018 (Planning Ref. 2014/00798/FUL).
- 2.2.5 The villages of Bonvilston and St Nicholas are the principal developed areas in proximity to the site. Bonvilston is approximately 750m north and St Nicholas, approximately 950m north-east of the parcel to the east of A4226.

### 2.3 DESIGNATIONS

- 2.3.1 The majority of the application site to the west of Five Mile Lane is allocated under Policy MG30 of the Vale of Glamorgan Local Development Plan as a "Local Search Area for Solar Energy". The whole site is located within a Special Landscape Area and mineral safeguarding area. Approximately 19ha of the western extent of the proposal site lies within a Registered Historic Landscape.
- 2.3.2 The nearest residential properties to the application site include seven properties along the unnamed track bounding the western edge of the application site. There are also residential properties in the nearby villages of Bonvilston and St Nicholas, with the closest property being approximately 500m from the northern boundary.
- 2.3.3 Adjacent to the southern boundary of the proposal site to the west of Five Mile Lane is Nant Whitton Woodlands which is a Site of Special Scientific Interest (SSSI) and Sites of Importance for Nature Conservation (SINC). A SINC is identified adjacent to the west and north-east of the proposal site.
- 2.3.4 The nearest Listed Building is the Grade II listed Ty Mawr (Great House) located approximately 850m to the north of the site and a Scheduled Ancient Monument (Ty'n-y-Coed Castle Ringwork) is adjacent to the site's northern boundary. The westmost area of the site lies within a historic landscape.
- 2.3.5 From the Vale of Glamorgan County Borough Council Definitive Map there are no public right of way within or along the boundaries of the site.
- 2.3.6 A utilities search identifies a high-pressure gas pipeline which runs north to south within the western part of deployment area 2. Following discussions with Wales and West Utilities, the deployment of solar panels are therefore removed from the field in which the pipeline runs.
- 2.3.7 There is a 132kV overhead power line that runs across the site, parallel to the northern boundary in an east to west alignment with six existing electricity pylon towers located within the application boundary. In addition, there is a 33kV overhead power line running south-east to north-west and a 11kV overhead power line running north to south at the western end of Development Area 1. Buffers were created between the deployment area and the power lines where applicable.
- 2.3.8 The site has a low risk of flooding as it is located within Zone A as shown on Natural Resources Wales Development Advice Maps.

## 2.4 ACCESS

2.4.1 Access to the proposal site is taken directly from the A4226 (Five Mill Lane) via existing field gates.

## 2.5 PLANNING HISTORY

2.5.1 Due to the nature of the proposal site as agricultural land, there is little planning history.

2.5.2 Planning history includes the approved renewal of application number 86/00795/FUL (planning reference 1990/01237/FUL) 5 Feb 1991. The application refers to raising level of land to provide safer and more beneficial agricultural use. On 14 Jan 1992, approval was given for outline permission for a detached farmhouse (planning reference 1990/01264/OUT).



## **3. THE PROPOSED DEVELOPMENT**

### 3.1 OUTLINE OF THE PROPOSAL

3.1.1 The proposal relates to the construction, operation, maintenance and decommissioning of a ground mounted Solar Farm and Battery Energy Storage System (BESS) plus ancillary infrastructure including the following main elements:

- Photovoltaic (PV) panels to a maximum height of circa 3m;
- Mounting frames - matt finished small section metal structure;
- BESS compound; containing c. 20 battery storage units set in bays of two surrounded by 3m high concrete firewalls, associated infrastructure, car parking and surrounded by c. 4m high acoustic fence and c. 2.4m high palisade fencing.
- Scheme of landscaping and biodiversity enhancement;
- Inverters and transformers will housed together in prefabricated containers, Substations (DNO and Customer) and associated cabling (below ground);
- Point of connection;
- Stock fencing up to a height of circa 2m to secure the development areas;
- Infra-red CCTV (CCTV cameras would operate using motion sensors and would be positioned inward only to ensure privacy to neighbouring land and property);
- Temporary set down areas;
- Internal service roads; and
- Site access for the construction, operational and decommissioning phases.

3.1.2 Oaklands Solar Farm will have an export capacity of circa 50MW of electricity, enough to power nearly 20,400 homes per year and offset approximately 20,200 tonnes of CO<sub>2</sub> every year, the equivalent of taking over 5,000 petrol / diesel cars off the road. The panels will be arranged in rows in an east-west alignment across the plots and orientated south.

3.1.3 The Battery Energy Storage System (BESS) will have a capacity to charge, store and export up to 50MVA of electricity to the local distribution network. The BESS will deliver significant environmental benefits, enabling technology for renewable generation, replacing the required for gas fired power generation and providing rapid response power to satisfy peak demand. In performing these roles, the development has the ability to reduce carbon dioxide emissions by over 20,600 metric tonnes annually whilst also providing electricity storage equivalent to supplying over 20,800 homes.

3.1.4 The scheme will be operational for 40 years after which the development will be decommissioned, and all equipment will be removed from site.

### 3.2 SITE DESIGN AND LAYOUT

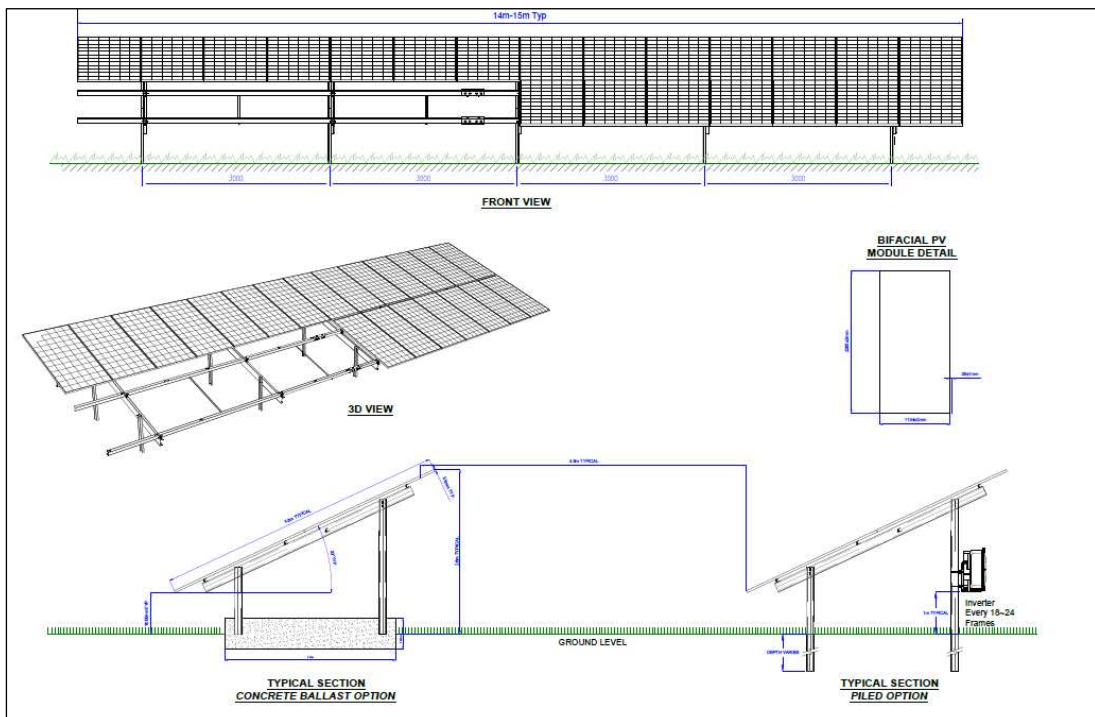
3.2.1 The proposed layout is shown on Drawing No. **SRE1113/02/03** (Doc Ref. 2.03). Due to commercial constraints, potential changes in solar panel, inverter, transformer and substation manufacturer during the determination process, an element of flexibility is required in relation to their dimensions, appearance and arrangement. The submitted layout is therefore indicative as the detailed layout and phasing of construction will be

agreed with the Local Planning Authority (LPA) by way of planning condition following grant of planning permission. This approach is commonplace in solar farm planning permissions.

### Solar Farm Proposals

- 3.2.2 The panels will be arranged in rows in an east-west alignment across the deployment areas and will be angled between 10° and 30° to the horizontal and orientated with panels facing south. The height of the panels will be up to 3m above ground level; the lowest part of the panel will measure approximately 0.9m above ground level. The rows of panels will be set approximately 3.2m apart to avoid shadowing and allow for scheduled maintenance, this will be dependent on local topography.
- 3.2.3 During construction, operation and decommissioning a buffer zone where no development will take place will be established from the hedgerow, ponds and streams.
- 3.2.4 There will be two types of mounting frames used on site. The majority will be matt finished galvanised steel that will be fixed to the ground employing a pile mounting system, the piles will be pushed into the ground via a mobile piling rig. Where there is the potential presence of archaeological findings on some parts of the site, the panel frames will be mounted on ballast blocks to ensure stability of the panels and frames without penetrating the ground. Drawing No. **SRE1113/02/05** (Doc Ref. 2.05) and **Figure 3.1** below provide a specification of the panel and frames.

**Figure 3.1: Panel and Frames Specification**



- 3.2.5 The solar panels will be connected to inverter units. The inverters convert electricity from Direct Current (DC) to Alternative Current (AC). The inverters then feed the transformers which step up the voltage ready to export to the local distribution network via the substation buildings and connecting cables. Details of the proposed ancillary equipment within the site are provided on Drawing No's. **SRE1113/02/06 - 08** (Doc Ref. 2.06-2.08).

3.2.1 Cabling from the inverters to the substation for each deployment area will be below ground. An earth cable will be required around the perimeter of each deployment area. Trench depths will vary from 0.4m to 1.3m depending on whether they are for earthing or AC cabling.

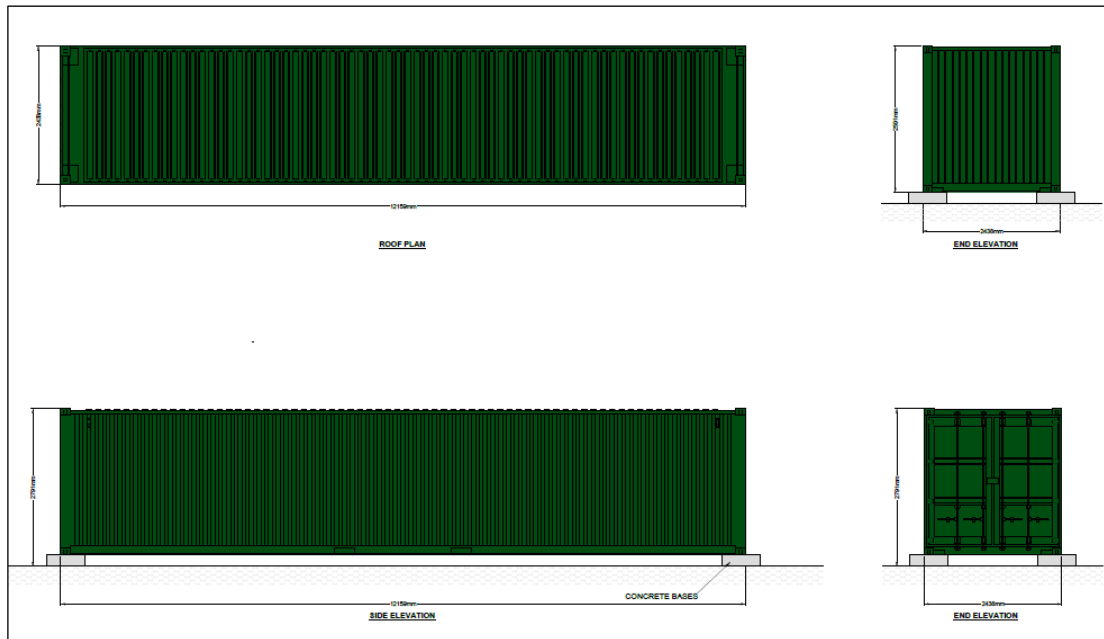
**Battery Energy Storage System (BESS)**

3.2.2 Western Power Distribution owns and operates the national electricity network. They are obliged to ensure that the electricity supply system runs within specified limits. Many factors change these operating conditions, but none more so than the balance between the electricity being demanded by customers connected to the national network and the electricity generators available to produce the electricity they require.

3.2.3 The Battery Energy Storage System (BESS) will have a capacity to charge, store and export up to 50MVA of electricity to the local distribution network. The facility will provide balancing services to the distribution network to ensure the future security of the country's electricity supply. The facility will provide power to the local distribution network in a short space of time when demand is greater than available supply.

3.2.4 The BESS compound is located within deployment area one near the site access, measuring approximately 1ha and will be surfaced in gravel. The BESS will comprise of c. 20 battery container units with each battery container accommodating 2.5MW of capacity. The battery container units have a similar appearance to shipping containers and measure typically 18.6m in length (including the air cooling and heating units at either end), 2.44m wide and 3.1m in height. Drawing No. **SRE1113/02/11** (Doc Ref. 2.11) and **Figure 3.2** below provide a specification for the battery container units.

**Figure 3.2: Battery Container Unit Specification**



3.2.5 The batteries will sit in bays of two surrounded by 3m high concrete firewalls.

3.2.6 The batteries will operate whenever called upon by Western Power Distribution. But as electrical demand is greatest in the morning and early evening this is when the facility is most likely to be delivering power to the grid.

3.2.7 The BESS compound also comprises two switchgear cabins, two spare storage cabins

and four containers, details of which are shown on Drawing No. **SRE1113/02/04** (Doc Ref. 2.04), along with 16 car parking spaces.

- 3.2.8 A c.4m high acoustic fence will surround the BESS compound, details of which are provided on Drawing No. **SRE1113/02/21** (Doc Ref. 2.21).

### 3.3 POINT OF CONNECTION AND CABLE ROUTE

- 3.3.1 The proposed point of connection is located at one of the six onsite pylons situated within Development Area 1 immediately north of the proposed BESS compound. A customer substation is to be located within the BESS compound and from here a cable will connect directly to the existing onsite pylon. Development Area 2 and Development Area 3 will be connected to the main customer substation at Development Area 1 by underground cabling which will be located within the adopted highway or within land where a lease agreement is in place with the landowner.

- 3.3.2 The indicative cable routes are presented in Drawing No's **SRE1113/02/14** (Doc Ref. 2.14). The drawings show a 'corridor' within which the cable will be laid. The exact alignment of the route is to be confirmed at the detailed design stage via separate authorisation from the Local Highway Authority.

### 3.4 SITE SECURITY

- 3.4.1 Once operational, the solar farm deployment areas will be secured by a c. 2m high stock fence or similar. Infra-red (non-visible at night), inward facing pole mounted CCTV cameras (c. 2.5m – 3m in height) will also be provided at between 50m and 100m intervals along the boundary fence. These will enable remote surveillance of the site. Fencing and CCTV camera details are presented on Drawing No. **SRE1113/02/16** (Doc Ref. 2.16). The CCTV cameras will be positioned to avoid views of any private property.
- 3.4.2 The BESS compound will be secured by a 4m high acoustic fence as illustrated on Drawing No. **SRE1113/02/21** (Doc Ref. 2.21).

### 3.5 CONSTRUCTION PROGRAMME

- 3.5.1 The construction of the proposed development is expected to last approximately 6 months and employ up to 80 staff over the construction period. An outline Construction Traffic Method Statement (CTMS) accompanies the application at **Appendix 12.2** (Doc Ref. 4.01.12b). This outline CTMS provides details of proposed access arrangements, the anticipated build programme, construction vehicle numbers and type, construction worker numbers and the proposed construction hours. The outline CTMS will be subject to final approval by the LPA post-consent under the terms of an appropriately worded planning condition.

### 3.6 SITE ACCESS

- 3.6.1 Access to the Development Areas will be achieved from Five Mille Lane (A4226). The A4226 provides a link between the main A48 trunk road to the north and Barry to the south. One operational, there will be three access points, one for each Development Area. However, during construction there will be two access points with Development Area 3 being accessed via Development Area 1.
- 3.6.2 The A4226 is a single-track, two-way road and is subject to the National Speed Limit. The topography of the A4226 in both directions of the site access points is predominantly flat, whilst the alignment of the road has a slight bend towards the west,



north of the site. A vehicle swept-path analysis showing a large articulated vehicle entering and existing the proposed site access points in a forward gear is presented in the outline CTMS at **Appendix 12.2** (Doc Ref. 4.01.12b).

- 3.6.3 To minimise the number of vehicle movements crossing the A4226 between plots, temporary set down areas will be provided both sides of the A4226. Drawing No. **SRE1113/02/24** (Doc Ref. 2.24) identifies the locations of the temporary set down areas.
- 3.6.4 Within the site, internal service roads will be constructed to access all areas of the site. The roads will be approximately 4m wide and will be finished with compacted crushed stone.
- 3.6.5 After commissioning and once operational, the site will only be visited during routine monthly maintenance checks. The access during the operational phase will be as per the construction routes.
- 3.6.6 The proposed development will have restricted public access. In designing the proposed development, emphasis will be placed on security. The design ensures the site is secure and not readily accessible to the public through the installation of deer fencing and infra-red CCTV. Access to the site will be through invitation only.
- 3.6.7 Details of the proposed access arrangements during construction are presented in the outline CTMS (**Appendix 12.2**, Doc Ref. 4.01.12b). Once operational, the proposal will generate minimal traffic flow from monthly inspections and maintenance. The CTMS will be subject to final approval by the LPA post-consent under the terms of an appropriately worded planning condition.

#### Car Parking

- 3.6.8 During construction of the development, it is expected that the site will provide sufficient available land for temporary parking, storage and lay-down for the construction phase. See drawing **SRE1113/02/24** (Doc Ref. 2.24) for details. Employees will access site via minibus that will be arranged by the contractor.
- 3.6.9 Once operational, the site will be manned remotely offsite. However, the site will be required to have monthly maintenance checks.

### 3.7 PUBLIC RIGHT OF WAY

- 3.7.1 There are no Public Rights of Way which run either through or adjacent to the site. The nearest Public Right of Way is located approximately 130m to the north-east of the site and runs in a north-east to south-west direction.

### 3.8 BIODIVERSITY ENHANCEMENTS AND LANDSCAPING

- 3.8.1 Biodiversity and landscape enhancements are at the forefront of the Oaklands solar and BESS proposals. In addition to land between and beneath the panels, there will be some areas of non-development land located within the application site that will be brought under formal management for the life of the scheme.
- 3.8.2 All hedges are to be retained around the site, with infilling of the gaps of missing sections undertaken. In addition to benefiting landscape and screening any visual issues, the retention of hedges will ensure that foraging, refuge and hibernation opportunities, protection from predators, and connectivity between habitats for wildlife within the local area is maintained and enhanced.

3.8.3 The Landscape and Visual Impact Assessment (LVIA) and Ecology and Nature Conservation chapters (ES chapters 7 and 11 respectively) provide full details of the enhancement proposals, but in summary these include:

- Management of grassland within the solar deployment zones to create a diverse sward between and around the solar arrays, of tussock grassland;
- Management of grassland margins outside of the solar deployment zones for biodiversity, the grassland fringes (low maintenance perennial meadow mix) will provide enhanced habitat fringes and contribute to increasing biodiversity levels in the local area;
- Reinforce existing hedgerows to improve visual containment of solar deployment areas (gapping up and growth to a greater height) Where appropriate on the boundary adjoining receptors (residential, roads and footpaths) the hedge will be allowed to grow up to at least c.3m tall to help to screen visibility from publicly accessible areas to the solar farm;
- Improve landscape structure of Development Area 1 (Pancross Farm) with the reinstatement of some lost historic hedgerows to restore the historic field structure, for both landscape / visual and ecological benefits;
- Additional standard sized hedge trees to be planted along the new hedgerows within the western area of Development Area 1, the Llancarfen Historic Landscape Area at random spacings. The planting will increase local tree coverage, filter visibility from sensitive receptors and provide green links between existing woodland areas.

3.8.4 A Landscape Mitigation Plan is included as Drawing No. **SRE1113/02/18** (Doc Ref. 2.18).

### 3.9 SITE WASTE MANAGEMENT PLAN

3.9.1 A Construction Environmental Management Plan (CEMP) will be prepared prior to the development works commencing on site. A Site Waste Management Plan (SWMP) will be prepared as part of the CEMP. The SWMP will detail:

- Actions to meet the waste hierarchy;
- Identify the person with responsibility for the SWMP;
- Details of the types and quantities of waste that will be produced by the Contractor as part of the construction phase; and
- Details of all consignments made for example a WRAP waste recording and reporting spreadsheet.

### 3.10 SURFACE WATER MANAGEMENT

3.10.1 Although the solar panels will divert the downward path of falling rain, being raised off the ground on frames, they will not reduce the permeable area where they are sited. Rainfall that does fall onto the site will, as now, infiltrate into the soil substrate. The amount of land that is made impermeable by the installation of the facility is limited to the concrete pads of the transformers and substations. Therefore, the surface water runoff from the developed site will be no different pre and post-development. There will be no increase in surface water run-off or exacerbation of off-site risk as a result of the proposals.

3.10.2 A separate application for SAB approval will be made.

### 3.11 DECOMISSIONING

3.11.1 After 40 years of operation the panels and associated infrastructure will be removed from site. The outline CTMS presented in **Appendix 12.2** (Doc Ref. 4.01.12b) details the programme and anticipated vehicle movements associated with this phase of development.



## 4. POLICY CONTEXT

## 4.1 INTRODUCTION

- 4.1.1 This section presents the key policy, legislation and guidance relevant to the proposed development. Section 38(6) of the Planning and Compulsory Purchase Act 2004 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”.*

- 4.1.2 The following section considers relevant national strategies, policy and guidance, and development plans as far as they are relevant to the proposed development. This relates to matters of energy and planning.

## 4.2 NATIONAL ENERGY CONTEXT

### Climate Change Act

- 4.2.1 The Climate Change Act 2008 required long term targets for the UK to achieve an 80% reduction in greenhouse gases by 2050 against 1990 levels. In June 2019, the Climate Change Act 2008 (2050 target Amendment) Order came into effect which required the net UK carbon account for the year 2050 to be 100% of 1990 levels.
- 4.2.2 The UK Act requires governments to set legally binding 'carbon budgets'. Each budget provides a five-year cap on total greenhouse emissions; in order to meet the UK's emission reduction commitments caps should not be exceeded.
- 4.2.3 The first carbon budget (2008-12) and the second (2013-17) have been met and the UK is on track to outperform the third (2018-22). However, it is not on track to meet the fourth (2023-27) or the fifth (2028-32).

### The Clean Growth Strategy: Leading the Way to a Low Carbon Future

- 5.1.1 The Clean Growth Strategy sets out a comprehensive set of policies and proposals that aim to accelerate the pace of clean growth. In order to meet the fourth and fifth carbon budgets (covering the periods of 2023-2027 and 2028-2032) the Government will need to drive a significant acceleration in the pace of decarbonisation and this Strategy sets out the policies that keep the UK on track to meet the carbon budgets.

### COP26 and the Net Zero Strategy

- 5.1.2 The UK hosted the 26<sup>th</sup> United Nations Climate Change Conference of the Parties (COP26) in Glasgow on 31 October – 13 November 2021. The COP 26 summit brought together 120 world leaders and representatives from 194 countries to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change. COP26 secured near-global Net Zero commitments from 153 countries. As highlighted during the recent COP26 event in Glasgow, *“We cannot afford to wait to act against the threat of climate change. We must work together to protect our planet and people and ensure a greener, more resilient future for us all”.*
- 5.1.3 In October 2021, the UK Government launched its Net Zero Strategy: Build Back Greener which will be submitted to the United Nations Framework Convention on Climate Change (UNFCCC) as the UK's second Long Term Low Greenhouse Gas Emission Development Strategy under the Paris Agreement and includes the target for decarbonising the UK's electricity grid by 2035. To deliver the strategy, overall electricity demand is expected to increase 40-60% by 2035, all met from low carbon source.

- 5.1.4 The 'Net Zero Strategy'<sup>6</sup> commits the UK to be powered entirely by clean electricity by 2035, which, in addition to a significant increase in renewable energy generation capacity, will require the deployment of new flexibility measures including energy storage to help smooth out power supply and future price spikes.
- 5.1.5 The British Energy Security Strategy was published in April 2022, in response to rising global energy prices, provoked by surging demand following the Covid-19 pandemic as well as Russia's invasion of Ukraine. This strategy is designed to reduce the UK's reliance on expensive fossil fuels, which are subject to volatile gas prices set by international markets we are unable to control, and boost its diverse sources of homegrown renewable energy to deliver greater energy security in the long-term. The strategy commits to a fivefold increase in solar deployment, with up to 70GW installed capacity by 2035. The paper sets out that by 2050, the Government ambition is to have a low-cost net zero consistent electricity system, most likely to be composed of predominantly wind and solar generation.

#### Environmental (Wales) Act 2016

- 4.2.4 The Act provides the necessary legislation to improve planning and management of natural resources in Wales. Part 2 of the Act relates to Climate Change and places an obligation on Welsh Ministers to reduce greenhouse gas emissions such that in the year 2050 they are at least 80% lower than baseline figures for 1990 or 1995, depending on the type of GHG.

#### Advice Report: Path to a Net Zero Wales

- 4.2.5 Required under the Environmental (Wales) Act 2016, the Report provides ministers with advice on Wales' climate targets between now and 2050 and assesses progress on reducing emissions to date. Prepared in December 2020 by the Climate Change Committee (an independent statutory body) the report states that meeting the Net Zero target in Wales requires action across four key areas; Reducing demand for carbon-intensive activities; Take-up of low-carbon solutions; Expansion of low-carbon energy supplies; Land; and Flexibility to meet Net Zero.

- 4.2.6 In April 2019, the Welsh Government Minister for the Environment, Energy and Rural Affairs, Lesley Griffiths AM declared a climate change emergency in Wales. The Welsh Government initially committed to a 95% reduction in emissions by 2050, but in February 2021 amended this to a legal commitment to achieve net zero emissions by 2050, with a stated ambition to "*get there sooner*". IACC declared a climate emergency in September 2020.

#### Prosperity for All: A Low Carbon Wales

- 4.2.7 The Environment (Wales) Act 2016 requires Welsh Government to reduce emissions of greenhouse gases (GHGs) in Wales by at least 80% for the year 2050 from 1990 levels with a system of interim emissions targets and carbon budgets. The Plan sets out how Wales aims to meet the first carbon budget (2016-2020) and consequently the 2020 interim target through 100 policies and proposals across Ministerial portfolios.

### 4.3 NATIONAL PLANNING CONTEXT

#### Futures Wales: The National Plan 2040

- 4.3.1 Future Wales: The National Plan 2040 (adopted February 2021) sets the direction of

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<sup>6</sup> <https://www.gov.uk/government/publications/net-zero-strategy>

development in Wales to 2040. Future Wales constitutes the development plan for Developments of National Significance (DNS) in line with s38(6) of the Planning and Compulsory Purchase Act 2004. It states:

*“Wales can become a world leader in renewable energy technologies. Our wind and tidal resources, our potential for solar generation, our support for both large and community scaled projects and our commitment to ensuring the planning system provides a strong lead for renewable energy development, mean we are well placed to support the renewable sector, attract new investment, and reduce carbon emissions”.*

4.3.2 As set out in legislation (Planning & Compulsory Purchase Act 2004 as amended by the Planning (Wales) Act 2015), applications for DNS must be determined in accordance with Future Wales, which is the national development plan for Wales.

4.3.3 Future Wales identifies 11 Outcomes to be achieved in 20-year’s time. Outcome 9 seeks a Wales where people live in places that sustainably manage their natural resources and reduce pollution. Outcome 11 seeks a Wales where people live in places which are decarbonised and climate resilient.

4.3.4 Future Wales states:

*“Wales is abundant in opportunities to generate renewable energy and the Welsh Government is committed to maximising this potential. Generating renewable energy is a key part of our commitment to decarbonisation and tackling the climate emergency.”*

4.3.5 Furthermore, Future Wales sets ambitious targets for 70% of electricity consumption to be generated from renewable energy by 2030.

4.3.6 The National Plan includes Policies 17 and 18 which are strategic spatial and detailed criteria-based policies respectively and should be considered together in the determination of applications.

4.3.7 Policy 17 demonstrates the Welsh Government’s support in principle for all renewable energy projects and technologies. Proposals should ensure there is no significant unacceptable detrimental impact on the surrounding natural environment and local communities and that the development delivers positive social, environmental, cultural and economic benefits. Policy 17 - Renewable and Low Carbon Energy and Associated Infrastructure states:

*“The Welsh Government strongly supports the principle of developing renewable and low carbon energy from all technologies and at all scales to meet our future energy needs. In determining planning applications for renewable and low carbon energy development, decision-makers must give significant weight to the need to meet Wales’ international commitments and our target to generate 70% of consumed electricity by renewable means by 2030 in order to combat the climate emergency...”*

*Proposals should describe the net benefits the scheme will bring in terms of social, economic, environmental and cultural improvements to local communities...”*

4.3.8 Policy 18 provides a decision-making framework for renewable and low carbon energy technologies. Policy 18 - Renewable and Low Carbon Energy Developments of National Significance states:

*"Proposals for renewable and low carbon energy projects (including repowering) qualifying as Developments of National Significance will be permitted subject to policy 17 and the following criteria:*

- 1. outside of the Pre-Assessed Areas for wind developments and everywhere for all other technologies, the proposal does not have an unacceptable adverse impact on the surrounding landscape (particularly on the setting of National Parks and Areas of Outstanding Natural Beauty);*
- 2. there are no unacceptable adverse visual impacts on nearby communities and individual dwellings;*
- 3. there are no adverse effects on the integrity of Internationally designated sites (including National Site Network sites and Ramsar sites) and the features for which they have been designated (unless there are no alternative solutions, Imperative Reasons or Overriding Public Interest (IROPI) and appropriate compensatory measures have been secured);*
- 4. there are no unacceptable adverse impacts on national statutory designated sites for nature conservation (and the features for which they have been designated), protected habitats and species;*
- 5. the proposal includes biodiversity enhancement measures to provide a net benefit for biodiversity;*
- 6. there are no unacceptable adverse impacts on statutorily protected built heritage assets;*
- 7. there are no unacceptable adverse impacts by way of shadow flicker, noise, reflected light, air quality or electromagnetic disturbance;*
- 8. there are no unacceptable impacts on the operations of defence facilities and operations (including aviation and radar) or the Mid Wales Low Flying Tactical Training Area (TTA-7T);*
- 9. there are no unacceptable adverse impacts on the transport network through the transportation of components or source fuels during its construction and / or ongoing operation;*
- 10. the proposal includes consideration of the materials needed or generated by the development to ensure the sustainable use and management of resources;*
- 11. there are acceptable provisions relating to the decommissioning of the development at the end of its lifetime, including the removal of infrastructure and effective restoration.*

*The cumulative impacts of existing and consented renewable energy schemes should also be considered.*

#### Planning Policy Wales Edition 11

- 4.3.9 The Welsh Government published Planning Policy Wales Edition 11 (PPW) in February 2021. This provides the overarching national level source of planning policy for Wales and is a material consideration alongside Futures Wales. It has been updated to take into account Futures Wales and the Wellbeing of Futures Generations Act which incorporates 7 wellbeing goals. It seeks to support the requirement for sustainable development via the planning system whereby the presumption in favour of sustainable development forms the overarching role together with a firm view on improving population wellbeing.



4.3.10 PPW sets out the specific planning policies for achieving sustainable development across Wales. Figure 4 sets out the key planning principles of this national policy, stating that:

*"The planning system has a vital role to play in making development resilient to climate change, decarbonising society and developing a circular economy for the benefit of both the built and natural environments and to contribute to the achievement of well-being goals".*

4.3.11 Chapter 5 (Providing and Enterprising Places) of the PPW sets out the Welsh Government's policies regarding Enterprising Placemaking and Wellbeing across Wales. One of the key aims in relation to energy is for Wales to generate 70% of its electricity consumption from renewable generation by 2030 and actively manage the transition to a low carbon economy.

4.3.12 Chapter 5 of the PPW outlines the importance of the planning system to deliver these targets, paragraph 5.7.15 states:

*"The planning system has an active role to help ensure the delivery of these targets, in terms of new renewable energy generating capacity and the promotion of energy efficiency measures in buildings."*

4.3.13 Paragraph 5.9.19 states that:

*"In determining applications for the range of renewable and low carbon energy technologies, planning authorities should take into account:*

- *The contribution a proposal will make to meeting identified Welsh, UK and European targets;*
- *The contribution to cutting greenhouse gas emissions; and*
- *The wider environmental, social and economic benefits and opportunities from renewable and low carbon energy development.*

4.3.14 Paragraph 5.9.20 continues stating:

*"Planning authorities should also identify and require suitable ways to avoid, mitigate or compensate adverse impacts of renewable and low carbon energy development. The construction, operation, decommissioning, remediation and aftercare of proposals should take into account:*

- *The need to minimise impacts on local communities, such as from noise and air pollution, to safeguard quality of life for existing and future generations;*
- *The impact on the natural and historic environment;*
- *Cumulative impact;*
- *The capacity of, and effects on the transportation network;*
- *Grid connection issues where renewable (electricity) energy developments are proposed; and*
- *The impacts of climate change on the location, design, build and operation of renewable and low carbon energy development. In doing so, consider whether measures to adapt to climate change impacts give rise to additional impacts."*

4.3.15 Chapter 5 also outlines that before an application is submitted "...developments should, where possible, consider how to avoid, or otherwise minimise, adverse impacts through careful consideration of location, scale, design and other measures". Furthermore, active engagement with the local community should be undertaken at pre-application stage.

#### 4.4 LOCAL CONTEXT

4.4.1 The Vale of Glamorgan County Borough Council Local Development Plan was adopted in June 2017 and provides the overarching strategic planning framework for the county area to 2026.

4.4.2 As Future Wales is the national, and highest, tier of development plan in Wales, Local Development Plans are required to be in accordance with it. S38(5) of the Planning & Compulsory Purchase Act confirms that:

*"If to any extent a policy contained in a development plan for an area conflicts with another policy in the development plan the conflict must be resolved in favour of the policy which is contained in the last document".*

4.4.3 For this application, the last document is Future Wales.

4.4.4 The key policies relating to sustainable development and renewable energy at the local level are:

- Policy SP1 – Delivering the Strategy
- Policy SP10 – Built and Natural Environment
- Policy MG17 – Special Landscape Areas
- Policy MG22 – Development in Mineral Safeguarding Areas
- Policy MG30 – Local Search Areas for Solar Energy
- Policy MD1 – Location of New Development
- Policy MD2 – Design of New Development
- Policy MD7 – Environmental Protection
- Policy MD8 – Historic Environment
- Policy MD89 – Promoting Biodiversity
- Policy MD19 – Low Carbon and Renewable Energy Generation

4.4.5 Each of the above policies are detailed below.

4.4.6 **Policy SP1 – Delivering the Strategy** is the Council's strategic policy in relation to providing sustainable development. It states that:

*"The strategy will seek to improve the living and working environment, promote enjoyment of the countryside and coast and manage important environmental assets. This will be achieved by: ...*

*6. Protecting and enhancing the built, natural and coastal environment;*

*8. Favouring development that promotes healthy living."*

4.4.7 **Policy SP10 – Built and Natural Environment** is a strategic policy in relation to environmental assets and reinforces that sensitive design and choice of location of new development can have a positive effect. It states that:

*"Development proposals must preserve and where appropriate enhance the rich and diverse built and natural environment and heritage of the Vale of Glamorgan including:*

1. The architectural and / or historic qualities of buildings or conservation areas, including locally listed buildings;
2. Historic landscapes, parks and gardens;
3. Special landscape areas;
4. The Glamorgan Heritage Coast;
5. Sites designated for their local, national and European nature conservation importance; and
6. Important archaeological and geological features.”

4.4.8 **Policy MG17 – Special Landscape Areas** is a specific policy to the protection of the designated Special Landscape Areas, which states that:

*“The following areas are designated as special landscape areas:*

1. Castle Upon Alun;
2. Upper & Lower Thaw Valley;
3. Ely Valley & ridge slopes;
- 4. Nant Llancarfan;**
- 5. Dyffryn basin & ridge slopes;**
6. Cwrt-yr-Ala basin.

*Within the special landscape areas identified above, development proposals will be permitted where it is demonstrated they would cause no unacceptable harm to the important landscape character of the area.”*

4.4.9 **Policy MG22 – Development in Mineral Safeguarding Areas** is a specific policy safeguarding mineral areas, which it states:

*“New development will only be permitted in an area of known mineral resource where it has first been demonstrated that:*

*... 3. The development would have no significant impact on the possible working of the resource by reason of its nature or size.”*

4.4.10 **Policy MG30 – Local Search Areas for Solar Energy** is one of the most directly relevant policies to the proposed development. It states that:

*“Local search areas for solar energy are shown on the Proposals map. In these areas proposals for solar energy generation schemes up to 50MW will be permitted provided there are no unacceptable effects on amenity, heritage assets or the environment.”*

4.4.11 **Policy MD1 – Location of New Development** is a strategic policy which sets out the framework for future development to take place on unallocated sites within the Vale of Glamorgan. It states that:

*“New development on unallocated sites should:*

1. Have no unacceptable impact on the countryside;
9. Have no unacceptable impact on the best and most versatile agricultural land.”

4.4.12 **Policy MD2 – Design of New Development** is the Council's strategic policy in relation to the key principles that developers should consider in respect of design, amenity and

access which together contribute to attractive, safe and accessible environments. It states that:

*“In order to create high quality, healthy, sustainable and locally distinct places development proposals should:*

*1. Be of a high standard of design that positively contributes to the context and character of the surrounding natural and built environment and protects existing features of townscape or landscape interest;*

*2. Respond appropriately to the local context and character of neighbouring buildings and uses in terms of use, type, form, scale, mix, and density;*

*... 8. Safeguard existing public and residential amenity, particularly with regard to privacy, overlooking, security, noise and disturbance;*

*... 10. Incorporate sensitive landscaping, including the retention and enhancement where appropriate of existing landscape features and biodiversity interests;*

*... 12. Mitigate the causes of climate change by minimising carbon and other greenhouse gas emissions associated with their design, construction, use and eventual demolition, and include features that provide effective adaptation to, and resilience against, the current and predicted future effects of climate change.”*

4.4.13 **Policy MD7 – Environmental Protection** is a strategic policy protecting people, residential amenity, property and / or the natural environment. It states that:

*“Development proposals will be required to demonstrate they will not result in an unacceptable impact on people, residential amenity, property and / or the natural environment from either:*

*1. Pollution of land, surface water, ground water and the air;*

*2. Land contamination;*

*3. Hazardous substances;*

*4. Noise, vibration, odour nuisance and light pollution;*

*5. Flood risk and consequences;*

*6. Coastal erosion or land stability;*

*7. The loss of the best and most versatile agricultural land; or*

*8. Any other identified risk to public health and safety.*

*Where impacts are identified, the Council will require applicants to demonstrate that appropriate measures can be taken to minimise the impact identified to an acceptable level. Planning conditions may be imposed or legal obligation entered into, to secure any necessary mitigation and monitoring processes.”*

4.4.14 **Policy MD8 – Historic Environment** is a strategic policy protecting and enhancing the historic environment. It states that:

*“Development proposals must protect the qualities of the built and historic environment of the Vale of Glamorgan, specifically:*

*1. Within conservation areas, development proposals must preserve or enhance the character or appearance of the area;*

*2. For listed and locally listed buildings, development proposals must preserve or enhance the building, its setting and any features of significance it possesses;*

*3. Within designated landscapes, historic parks and gardens, and battlefields, development proposals must respect the special historic character and quality of these areas, their settings or historic views or vistas;*

*4. For sites of archaeological interest, development proposals must preserve or enhance archaeological remains and where appropriate their settings.”*

- 4.4.15 **Policy MD89 – Promoting Biodiversity** is a permissive, criteria-based policy which seeks to enable appropriate proposals in line with biodiversity conservation. It states that:

*“New development proposals will be required to conserve and where appropriate enhance biodiversity interests unless it can be demonstrated that:*

*1. The need for the development clearly outweighs the biodiversity value of the site; and*

*2. The impacts of the development can be satisfactorily mitigated and acceptably managed through appropriate future management regimes.”*

- 4.4.16 **Policy MD19 – Low Carbon and Renewable Energy Generation** is the Council’s strategic policy in relation to renewable energy. It states that:

*“Proposals for the generation of low carbon and renewable energy will be permitted where it can be demonstrated that there is no unacceptable impact on the interests of:*

*Best and most versatile agricultural land;*

*Aviation safeguarding;*

*Electrical, radio or other communication systems;*

*Landscape importance;*

*Natural and cultural heritage;*

*Nature conservation;*

*Residential amenity; and*

*Soil conservation.*

*In assessing such proposals, the cumulative impacts of renewable energy schemes will be an important consideration. Where necessary, proposals should be informed by a landscape and visual impact assessment.*

*Favourable consideration will be given to proposals that provide opportunities for renewable and low carbon energy and / or heat generation to be utilised within the local community.”*

## 4.5 SUMMARY AND CONCLUSION

- 4.5.1 This section of the ES outlines the policy context for the determination of Oaklands Solar Farm and BESS.

- 4.5.2 There is clear policy support for renewable energy schemes at both the local and national level, particularly as such schemes will support a vibrant and decarbonised

economy.

- 4.5.3 Whilst policy takes a positive approach to the renewables sector, development proposals need to be mindful of local constraints, communities and natural resources.
- 4.5.4 This ES reports on a detail assessment of the site and its environs and how they are anticipated to interact with the proposed development.
- 4.5.5 The Planning Statement that accompanies the planning application presents a detailed appraisal of the proposal in the context of the above policies.



## **5. NEED AND ALTERNATIVES**

## 5.1 INTRODUCTION

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

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

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

5.1.3 This chapter includes the following sections:

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

## 5.2 NEED FOR THE DEVELOPMENT

5.2.1 Man-made climate change is generally considered to be the greatest existential threat to the environment, our way of living and humanity in general. The extreme heat, wildfires and drought conditions experienced in the UK and Europe during the summer of 2022 were a dramatic reminder of this reality. Addressing this huge challenge requires a sea change in how we live our lives in the future and the decisions we all make.

5.2.1 In order to address this challenge, the UK Government have set a target to decarbonise the power grid and ensure all cars are zero emissions capable by 2035 thus moving away from fossil fuels and replacing this capacity with renewable energy.

5.2.1 In addition to this, recent months have brought into stark focus the need for the UK to improve its energy security to ensure both continuity of supply, reduced costs to the consumer and avoid future price spikes caused by geo-political events. In response to this additional challenge the UK government has published The British Energy Security Strategy which commits to a low-cost net zero consistent electricity system, supported by large scale long duration electricity storage.

5.2.1 This transition is predicted to result in an increase in electricity demand by 40%-60% all of which must be met from renewable energy sources.

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

*“...planning applications for renewable and low carbon energy developments should be determined based on the merits of the individual*



*proposal. The local need for a particular scheme is not a material consideration, as energy generation is of national significance and there is a recognised need to optimise renewable and low carbon energy generation".*

- 5.2.3 Chapter 4 sets out key national and local planning policy that is relevant to the need for the Development.
- 5.2.4 Both Future Wales and PPW set ambitious targets for 70% of electricity consumption in Wales to be supplied from renewable energy sources by 2030.
- 5.2.5 In February 2021, the Welsh Government set out its legal commitment to achieve net zero emissions by 2050<sup>7</sup>. The Energy Generation in Wales 2018 report<sup>8</sup> estimates that 50% of electricity consumption comes from renewable sources leaving a significant shortfall if the Government's target is to be met.
- 5.2.6 At local level, In July 2019, the Vale of Glamorgan Council declared a climate emergency with an aim to reduce the Council's carbon emissions to net zero by 2030.
- 5.2.7 The need for the development of renewable energy generation and storage facilities to address the dual threats and challenges of man made climate change and energy security is well established and supported at an international, national and local level in terms of strategy, legal commitments and policy.
- 5.2.8 The proposed development at Oaklands farm has two components which will directly contribute to meeting this need – Solar power generation and battery energy storage.

#### Solar Energy

- 5.2.9 It is widely accepted that electricity produced from solar energy has a positive benefit compared to traditional forms of electricity generation in terms of avoiding carbon dioxide emissions. Furthermore, renewable energy from PV supports the national economic objective to diversify energy supply and to lessen dependence on the importation of fossil fuels. The Government consequently considers that the wider benefits to society and the economy (of renewable energy) are significant and must be given weight by decision makers in reaching their decisions on individual applications.
- 5.2.10 The proposed solar farm would have a maximum capacity of 50MW which would generate enough electricity to power the equivalent of approximately 20,400 local homes and businesses. The proposal would see a reduction in the emissions of CO<sub>2</sub> of around 20,200 tonnes per annum, i.e. over 800,000 tonnes over the lifetime of the development. This is the equivalent of taking approximately 5,000 petrol / diesel cars of the road each year. In addition, the operation of the scheme would reduce the emissions of the gases sulphur dioxide and nitrogen oxides, which contribute to the production of acid rain.

#### Battery Energy Storage

- 5.2.1 The National Grid experiences a large fluctuation of demand throughout the day and throughout different times of the year. During periods of high demand, the National Grid aim to increase supply to maintain a 20% supply margin which is essential in eliminating, as far as possible, the risk of power shortages and blackouts, when there

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<sup>7</sup> <https://gov.wales/wales-commits-net-zero-2050-sets-out-ambitions-get-there-sooner>

<sup>8</sup> Energy Generation in Wales 2018: <https://gov.wales/sites/default/files/publications/2019-10/energy-generation-in-wales-2018.pdf>

is an unexpected change in demand, or a sudden loss of supply. Historically, conventional power stations could be operated with some certainty. However, as the UK moves towards a more environmentally sustainable energy supply system, with an increase in renewable energy sources, there is an increased risk of electricity supply fluctuations, depending on prevailing weather conditions, and therefore an increased need for facilities to store energy, in order to try and match the supply to the demand. Such storage facilities include Battery Energy Storage Systems (BESS).

5.2.1 BESS do not create carbon emissions or generate electricity but provide a balancing mechanism drawing electricity (charging) when levels of the network are above that of demand. When levels of electricity on the grid are below that of demand the electricity stored in the batteries can be fed back (discharged) onto the network to meet the demand so that there is no loss of power to end users. Smooth grid operation relies on the provision of rapid reactive power services either by generation or dedicated facilities to enable frequency stabilisation. BESS provides sub-second response times, so offer a reliable solution to a number of the Grid's balancing issues thus supporting the development and deployment of low carbon intermittent energy technologies upon which society must increasingly rely on to satisfy its energy requirements.

5.2.1 The Department for Business, Energy and Industrial Strategy stated in a press release in July 2020 that:

*"...flexible technologies like batteries will form part of the UK's smarter electricity grid, supporting the integration of more low-carbon power, heat and transport technologies..."*

*The key to capturing the full volume of renewables is in ensuring homes and businesses can still be powered by green energy when the sun is not shining, or the wind has stopped blowing".*

5.2.2 The National Grid note:

*"Battery storage technologies are essential to speeding up the replacement of fossil fuels with renewable energy. Battery storage systems will play an increasingly pivotal role between green energy supplies and responding to electricity supplies".*

5.2.3 Sirius Renewable Energy Limited seeks to support the increase in renewable energy generation and its transition to a lower carbon energy supply system through developing a solar farm and BESS on land at Oaklands Farm.

### 5.3 SITE SELECTION

5.3.1 The Development Areas that make up the application site were selected through an extensive search criteria exercise undertaken by Sirius Renewable Energy over a number of years. The Vale of Glamorgan represents a particularly favourable area for solar deployment because of the high levels of solar irradiation through its proximity to the coastline. This can increase power generation over sites of equivalent size located away from the coast. Using The Vale of Glamorgan Renewable Energy SPG as a guide to focus the site search, the Applicant reviewed a number of sites across the Vale of Glamorgan to assess the potential for the development of solar projects.

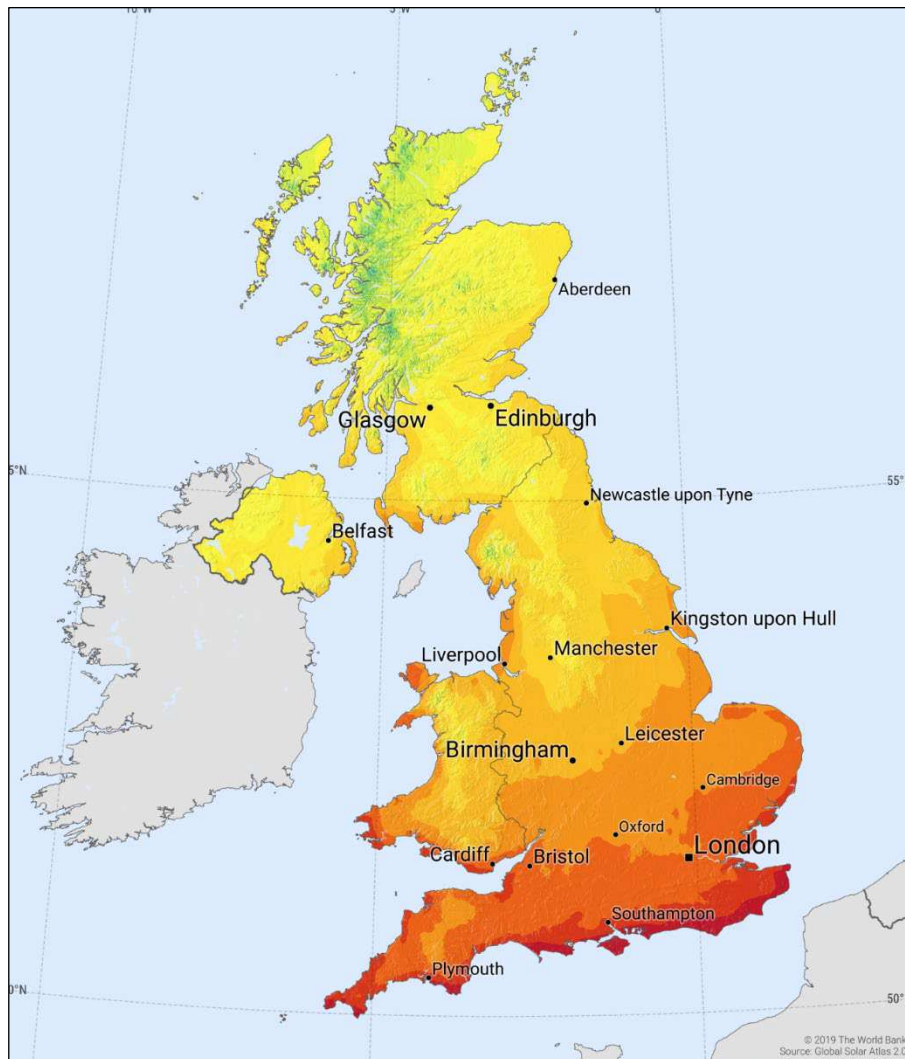
5.3.2 A range of technical, environmental and economic factors are considered when assessing a site for ground-mounted solar PV development. Key factors for consideration, in no particular ranked order, include:

- Solar irradiation levels;
- Availability and proximity of the local distribution network (grid);
- Proximity to local population;
- Topography;
- Field size and shape;
- Potential for overshadowing;
- Development Plan Policy;
- Access to the site for construction/decommissioning traffic;
- Agricultural land quality;
- Landscape sensitivity and visual impact amenity;
- Nature conservation and potential for enhancement;
- Flood risk; and
- Land availability.

### Solar Irradiation Levels

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

**Figure 5.1: UK Irradiance Levels**



### Availability and Proximity to Distribution Network

- 5.3.4 An important aspect of solar farm development is having access to the local distribution network, or 'grid'. To export electricity generated by a solar farm there must be sufficient capacity on the network to accommodate the additional power from the development. Availability of grid capacity in the UK is at a premium and incredibly scarce due to the way the UK electricity distribution and transmission system has evolved from one which is designed to move power over large distances from centrally located fossil fuel power stations. As a result of this there are very few available locations at which renewable energy power generation and energy storage schemes can connect effectively to the grid and the site at Oaklands farm happens to be one of these locations, with the developer having secured a grid connection agreement with Western Power Distribution which has been approved through the Statement of Works process by Western Power Distribution.
- 5.3.5 Proximity to an available grid connection is critical to the viability of any renewable energy project. The industry-standard approach is to secure sites within 3.5km of a grid connection. This is partly due to the requirement for easements to enable the crossing of third-party land, and necessary roadworks which may disrupt local communities. Additionally, long cables introduce voltage drops and unwanted energy losses which cause further difficulties for the distribution network operators. It is also far more costly to connect at distance, therefore effecting the viability of any renewable energy project.

### Proximity to Local Population

- 5.3.6 For any development minimising potential impacts to residential amenity is a key aspect. Therefore, distance from centres of population is a key locational factor for a proposed solar farm and BESS development. In some cases, it is not possible to be distant from the curtilage of every residential property however it is an important element of the site selection process that impacts on local residences are minimised.
- 5.3.7 The low height of the solar farm (panels will be up to 3m above ground level), the existing woodland and hedgerow screening, landscaping and topography means that views of the site are restricted to longer distance views. This has been confirmed in the Landscape and Visual Impact Assessment (LVIA) as reported in Chapter 7 of this ES. Where there are residential properties adjacent to the deployment areas, a buffer zone (and additional hedgerow planting where appropriate) has been applied to set back the panels from the curtilage of properties so as to avoid negatively impacting the enjoyment of these areas.

### Topography

- 5.3.8 Flat or gently undulating land is preferred for solar development as construction is more straightforward, shading between arrays is limited and more consistent and flat land is generally less visible than slopes where the surrounding topography is also flat or has gentle gradients. The design of the site will however respond to the terrain and physical features.
- 5.3.1 The vast majority of the Development Areas are flat and is well suited to the proposed scheme.

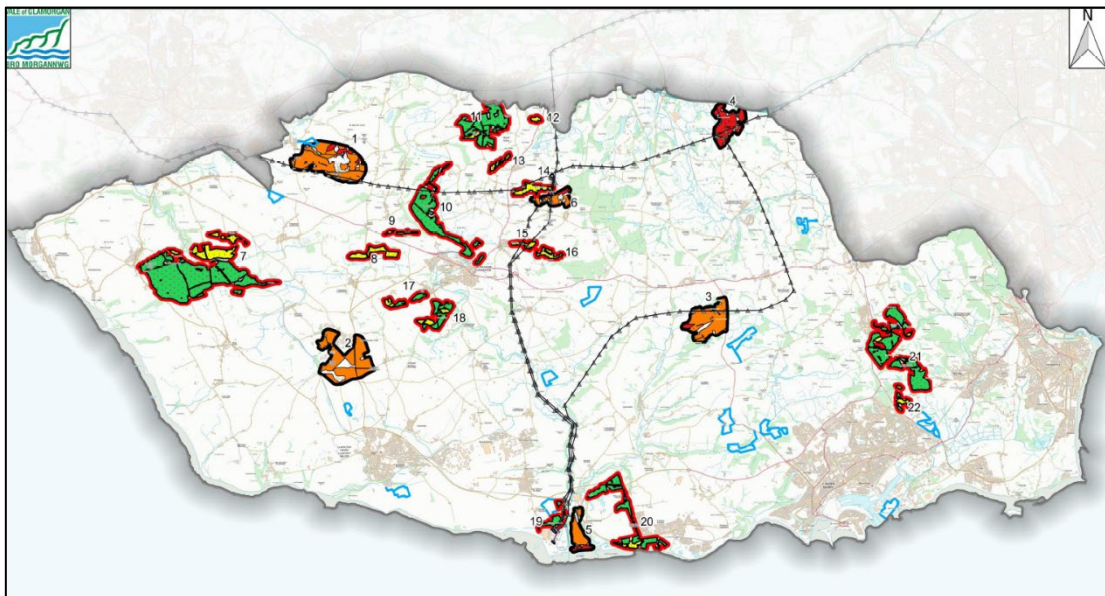
### Field Size

- 5.3.2 In the efficient deployment of solar large, open fields are preferable. However, smaller fields with established field boundaries will help to visually contain a solar proposal and be more sympathetic to local landscape character. Therefore, a balanced approach to field size and boundary treatment is needed.
- 5.3.3 The application site includes a range of field sizes with larger ones included in Areas 1 and 2 and well contained fields in Area 3.

### Site Specific Allocation

- 5.3.4 Policy MG30 of the adopted Vale of Glamorgan Local Development Plan identifies the majority of the application site to the west of the A4226 as 'Local Search Areas for Solar Energy'. The policy states that in this area, proposals for solar energy generation schemes up to 50MW will be permitted provided there are no unacceptable effects on amenity, heritage assets of the environment.
- 5.3.5 **Figure 5.2** below illustrates the potential solar energy areas within Vale of Glamorgan. The highlighted orange areas are opportunity areas for solar, as referenced in the LDP Policy MG30. The areas outlined in blue are operational solar farms and those highlighted in yellow and green identify other areas which also have solar energy potential based upon an update within the evidence base. As can be seen in **Figure 5.2**, an area of the application site is highlighted orange and shown as an allocated potential area for solar development (labelled Site Number 3).

**Figure 5.2: Potential Areas for Solar (Renewable Energy SPG March 2019 – Assessing Solar Photovoltaic (PV) Farm Resource)**



### Access to Site for Construction

- 5.3.6 Appropriate access to the solar deployment areas must be available for the construction and decommissioning phases. The A48 runs east to west c. 1km to the north of the Development Areas from which Five Mile Lane (A4226) runs south which provides vehicular access to the site entrances. All Development Areas have vehicular access in the form of field gates from the public highway.

- 5.3.7 A Construction Traffic Management Statement (CTMS) accompanies this application (**Appendix 12.2**, Doc Ref. 4.01.12b) and sets out the proposed access arrangements to each of the Development Areas; vehicle routing from the A48; the anticipated construction programme, construction vehicle numbers; construction worker numbers and the proposed construction hours.

#### Agricultural Land Classification

- 5.3.8 National level guidance on the deployment of ground mounted solar expresses a preference to avoid 'Best and Most Versatile (BMV) Agricultural Land'. Grades 1, 2 and 3A of the Agricultural Land Classification are considered to be Best and Most Versatile land, whilst 3B, 4 and 5 are not.
- 5.3.9 The soil survey presented in **Appendix 6.1** (Doc Ref. 4.01.5) of this ES has determined that the site is dominated by lower quality land; subgrade 3b and Grade 4 soils and is therefore not classed as comprising BMV land.
- 5.3.10 Furthermore, the solar farm will operate alongside grazing as part of the management of the grass sward. In addition, the construction and decommissioning of the solar farm will have little impact on the land quality as the fields will be returned to full agricultural use on removal of the solar farm and associated infrastructure.

#### Landscape Designations

- 5.3.11 Consideration of national and local landscape designations such as Areas of Outstanding Natural Beauty, National Parks and Special Landscape Areas was undertaken when assessing the potential solar sites.
- 5.3.12 The adopted Vale of Glamorgan Local Development Plan Proposals Map identifies the majority of the site to the west of the A4226 as being a 'Local Search Areas for Solar Energy'.
- 5.3.13 The whole site is located within two Special Landscape Areas (SLA) which are separated by the A4226; SLA4 Nant Llancarfen (west of the A4226) and SLA6 Drffryn Basin and Ridge Slopes (east of the A4226). In addition, approximately 19ha of the western extent of area 1 lies within a Registered Historic Landscape Area (HLA) of Llancarfan.
- 5.3.14 Effects upon landscape character and views from around the site have been assessed by Landscape and Visual Impact Assessment (LVIA) presented in Chapter 7.

#### Nature Conservation Designations

- 5.3.15 Consideration of national and international ecological designations such as Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites was undertaken when assessing the potential for a solar proposal.
- 5.3.16 Approximately 190m to the south-west of the proposal site boundary is Nant Whitton Woodlands Site of Special Scientific Interest (SSSI). The following Sites of Importance for Nature Conservation (SINC) are located adjacent to the proposal site boundary:
- Coed Quinnet - adjacent to part of the western and southern boundary of Area 3;

- Land South of Ty'n-y-Coed - adjacent to part of the western boundary of Area 1;
- Redland Wood - adjacent to part of the northern boundary of Area 1;
- Coed cym - adjacent to part of the northern boundary of Area 2;
- Land along River Waycock - adjacent to part of the eastern boundary of Area 2;
- Brook Wood - adjacent to part of the southern boundary of Area 2; and
- Betty Lucas Wood - adjacent to part of the southern boundary of Area 2.

5.3.17 Biodiversity enhancement schemes are an integral part of solar proposals as the land is effectively managed for 40 years for the benefit of ecology. As part of the proposals for Oaklands Solar and BESS, ecological management is a core element. Not only are the development areas managed for species rich grassland, areas within the site not subject to solar PV deployment will also be managed to secure ecological benefits.

5.3.18 Potential effects on designated ecological sites and mitigation measures proposed are addressed in Chapter 11.

#### Flood Risk

5.3.19 Although solar farm developments are not strictly flood sensitive infrastructure, some ancillary electrical infrastructure are such as the cables transferring the power to the substation, the substation itself and the inverters.

5.3.1 The majority of the application site is located within Flood Zone A and therefore considered to be at little or no risk of fluvial or tidal / coastal flooding. The Flood Risk Assessment presented in **Appendix 10.1** (Doc Ref. 4.01.10) confirms the site to be at little or no risk.

#### Commercial Agreement with the Landowner

5.3.2 Having established the areas potential to accommodate the development it was then necessary to investigate whether sufficient land would be available to allow the development to proceed. To this effect, discussions were held with local landowners to determine interest.

5.3.1 The proposed development presents an attractive proposition to the landowners due to the comparative uplift in returns that could be achieved from the land from a development of this nature. Commercial terms have been agreed with the landowners for the construction and operation of a solar farm subject to the necessary consents. This established the fundamental deliverability of the development on these sites.

## 5.4 CONSIDERATION OF ALTERNATIVES

### Do Nothing Scenario

5.4.1 Should the proposal not be implemented it is likely the site would continue to be used as grazing land/silage/haymaking. As a result, the benefits of the proposed scheme would not happen, the key effects include:

- Powering approximately 20,400 homes per year from a renewable source of energy offsetting approximately 20,200 tonnes of CO<sub>2</sub> each year for the life of the development;

- The BESS will deliver significant environmental benefits, enabling technology for renewable generation, replacing the requirement for gas fired power generation and providing rapid response power to satisfy peak demand. In performing these roles, the development has the ability to reduce carbon dioxide emissions by over 20,600 tonnes annually whilst also providing electricity storage equivalent to supplying over 20,800 homes;
- Inward investment into the local economy, using local businesses as part of the supply chain during the construction; and
- Significant enhancement of local biodiversity, including scope for a 173.02% biodiversity net gain.

#### Alternative Schemes for Renewable Energy

5.4.2 Alternative renewable energy developments were considered for utilising the grid connection. Onshore wind turbines / wind farm to generate power were investigated in this location, however the close proximity to Cardiff airport and the potential for interference with radar were problematic. Wind turbines can also have the potential to impact on bird populations. The close proximity to several SINC's were considered to represent constraints, given they have potential to attract birds (and therefore ornithological impacts).

5.4.3 In addition, it is important to consider the residential amenity of nearby dwellings when siting wind turbines as TAN 8 (Renewable Energy) states that *"500m is currently considered a typical separation distance between a wind turbine and residential property to avoid unacceptable noise impacts"*. There are a number of residential properties within 500m of the deployment areas which could represent a constraint to any prospective wind turbine development. Therefore, onshore wind turbines were discounted.

#### Alternative Sites

5.4.4 Policy MG30 of the adopted Vale of Glamorgan Local Development Plan Proposals Map identifies the majority of the application site to the west of the A4226 as a 'Local Search Areas for Solar Energy'.

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

5.4.6 The attributes of the Oaklands Farm site which led to its inclusion as an area of search for solar development in the adopted Local Plan makes the application site uniquely suited to this type of development.

#### Alternative Configuration of Sites

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

5.4.7 In terms of ecology, appropriate buffers are integrated from existing and proposed vegetation (typically a minimum of 4m from vegetation to the site boundary fence and a further 4m from the fence to the solar arrays) with development restricted from within the canopy of trees, particularly notable in Development Area 2. The layout of the arrays within the site area has been designed so that the existing mature hedgerows,




tree cover and scrub around and within the site boundaries can be retained. The reinstatement of some lost historic hedgerows within Development Area 1 has been incorporated to improve landscape structure and restore the historic field structure. In terms of visual impacts, a minimum offset distance of 50m from all residential receptors to remain clear of development has been included. In addition, existing hedgerows will be reinforced to improve visual containment of the solar deployment areas.

- 5.4.8 A high-pressure gas pipeline ran north to south within the western part of Development Area 2. Following discussions with Wales and West Utilities, the deployment of solar panels were therefore removed from the field.
- 5.4.9 Through exhaustive environmental assessment covered elsewhere in this application and an iterative process of design review the optimum site configuration is now included as the proposed design for the solar and battery energy storage development at Oaklands Farm which optimises the utilisation of available grid capacity whilst minimising environmental impact and maximising the environmental benefit of the scheme.

## 5.5 CONCLUSION

- 5.5.1 It has been demonstrated through the above site selection criteria that there are no suitable and available alternatives within a reasonable distance of the point of connection. Once the preferred site was identified, the iterative design process, environmental and technical assessments necessitated further refinement of proposed deployment area in order to minimise potential adverse environmental effects and enhance benefits where possible.

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**6.  
ENVIRONMENTAL  
CONSIDERATIONS  
NOT  
SIGNIFICANTLY  
AFFECTED BY THE  
PROPOSAL**

## 6.1 INTRODUCTION

6.1.1 This chapter considers those topics that are not deemed to be significantly affected by the proposal and were confirmed as being 'scoped out' of the Environmental Impact Assessment by the Scoping Direction provided by the Planning Inspectorate (now PEDW) in July 2021 (**Appendix 1.2**, Doc Ref. 4.01.2). Scoped out environmental topics include:

- Soils, Geology and Agricultural Land;
- Glint and Glare; and
- Socio Economic.

## 6.2 SOILS, GEOLOGY AND AGRICULTURAL LAND

6.2.1 The application site has been in agricultural use since the 1800s (determined by mapping regression). As such there is unlikely to be land contamination issued associated with previous use. Therefore, ground contamination has been scoped out of the EIA accordingly.

6.2.2 The nature of the development, being temporary and reversible, means that a detailed understanding of local geology is not required. The mounting system and trenching for the below ground cables typically reach a depth of 1.2m. Therefore, geology has been scoped out of the EIA accordingly.

### Agricultural Land Quality

6.2.3 The Scoping Direction (**Appendix 1.2**, Doc Ref. 4.01.2) confirmed that given the limited potential for 'Best and Most Versatile' land on the site and comments received from The Landscapes, Nature and Forestry Division of the Welsh Government, Agricultural Land Quality can be scoped out of the ES. However, due to the size of the site, it was agreed that a soil assessment be undertaken as a standalone document.

6.2.4 Development Areas 1 (Pancross) and 2 (Redlands) were subject to a Welsh Government Agricultural Land Survey (ref. 021-90) in 1990 in which a mixture of subgrade 3b and 4 land quality was found.

6.2.5 An Agricultural Land Classification (ALC) Survey has been undertaken across Development Area 3 (Oaklands) in support of this application. The assessment along with the Welsh Government 1990 survey is presented in **Appendix 6.1** (Doc Ref. 4.01.5) (report reference 1886/1) to this ES.

6.2.6 The land has a mixture of shallow and deeper fine loamy soils and fine loams over clays.

6.2.7 The assessment concludes that ALC grades 3b and 4 occur across approximately 124ha of the Development Areas due to wetness constraints with 'other land' including farm tracks, blocks of woodland and water bodies accounting for approximately 2.1ha.

6.2.8 It should be noted that the Welsh Government commissioned an Assessment of Onshore Wind and Solar Energy Potential in Wales in 2019<sup>9</sup>. The criteria used to identify priority areas for solar energy excluded ALC grades 1 and 2 from the search, suggesting that ALC grades 3a, 3b, 4 and 5 were considered acceptable areas for solar development.

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<sup>9</sup> <https://gov.wales/sites/default/files/publications/2019-08/stage-1-development-of-priority-areas-for-wind-and-solar-energy.pdf>

- 6.2.9 In addition, the construction and decommissioning of the proposal will have little impact on the land quality as the fields can be returned to agricultural use on removal of the facility and associated infrastructure.

### Conclusion

- 6.2.10 The assessment has determined that the Development Areas do not contain 'Best and Most Versatile' (BMV) agricultural land. In addition, given the temporary nature of the development, there will be little impact on land quality as the fields can be returned to agricultural use on removal of the solar farm and BESS. The proposed development does not therefore result in a detrimental impact on land quality or the supply of 'Best and Most Versatile' land.

## 6.3 GLINT AND GLARE

- 6.3.1 The Scoping Direction (**Appendix 1.2**, Doc Ref. 4.01.2) confirmed that Glint and Glare can be scoped out of the ES and assessed in a standalone document.
- 6.3.2 Photovoltaic solar panels are specifically designed to absorb light rather than reflect it. Light reflecting from solar panels results in a loss of energy output. PV modules are dark in colour due to their antireflective coatings and are manufactured with low-iron, ultra-clear glass with specialised coatings and textures to enable maximum absorption. The combination of these factors significantly increases electrical energy production of the panels and at the same time significantly reduces the potential for reflected rays.
- 6.3.3 A Glint and Glare Assessment is presented in **Appendix 6.2** (Doc Ref. 4.01.5). Analysis of the site has determined that reflected light is of a low intensity, scattered and is generally reflected upwards away from roads and residential properties. However, there exists conditions in early and late summer when the sun is low in the sky in which reflected sun rays can travel in a direction parallel to the ground. Under these conditions, rays (which are scattered at the surface of the module) will, for drivers on local roads be caught by existing hedgerows surrounding the site. In terms of aviation, the assessment considers that there are no circumstances that exist where the proposed solar farm would constitute a hazard from glint and glare to approaching or leaving aircraft from either airport.
- 6.3.4 The assessment concludes that the proposed solar farm will not give rise to any additional hazardous or troublesome reflections beyond those that already exist in the natural environment.

## 6.4 SOCIO-ECONOMIC

- 6.4.1 The Scoping Direction included at **Appendix 1.2** (Doc Ref. 4.01.2) confirmed that socio-economic considerations could be scoped out of the ES.
- 6.4.2 Climate change is generally considered to be the greatest existential threat to the environment, our way of living and humanity in general. Addressing this huge challenge requires a sea change in how we live our lives in the future and the decisions we make going forward.
- 6.4.3 As highlighted during the recent COP26 event in Glasgow, *"We cannot afford to wait to act against the threat of climate change. We must work together to protect our planet and people and ensure a greener, more resilient future for us all"*.
- 6.4.4 In addition to this, recent months have brought into stark focus the need for the UK to

improve its energy security to ensure both continuity of supply, reduced costs to the consumer and avoid future price spikes caused by geo-political events.

- 6.4.5 The UK Government's "Net Zero Strategy"<sup>5</sup> commits the UK to be powered entirely by clean electricity by 2035, subject to security of supply. In order to meet this target a key component is the deployment of new flexibility measures including energy storage to help smooth out power supply delivery and future price spikes.
- 6.4.6 The British Energy Security Strategy was published in April 2022. This Strategy commits to a five fold increase in solar deployment, with a target of up to 70GW installed capacity by 2035. The paper sets out that by 2050, the Government ambition is to have a low-cost net zero consistent electricity system, supported by large scale long duration electricity storage. This transition is predicted to result in an increase in electricity demand by 40%-60%, all of which must be met from renewable energy sources.
- 6.4.7 Future Wales: The National Plan 2040 (adopted February 2021) sets the direction of development in Wales to 2040. Future Wales states:
- "Wales is abundant in opportunities to generate renewable energy and the Welsh Government is committed to maximising this potential. Generating renewable energy is a key part of our commitment to decarbonisation and tackling the climate emergency."*
- 6.4.8 Furthermore, Future Wales sets the ambitious target for 70% of electricity consumption to be generated from renewable energy by 2030.
- 6.4.9 At a local level, the need to mitigate the effects of climate change, e.g. reduce greenhouse gas emissions, promote generating renewable energy and low carbon is accepted as a key issue. The Vale of Glamorgan Council declared a climate emergency in July 2019 with an aim to reduce the Council's carbon emissions to net zero by 2030.
- 6.4.10 The Solar PV network now accounts for around 12% of all renewable electricity generated in Wales. The Energy Generation in Wales Report 2019<sup>10</sup> suggests a significant decrease in renewable distribution levels compared to the last few years, therefore progress has slowed with regard to meeting targets and transitioning local economies to clean energy. Despite this, it does highlight an existing internal network of knowledge and skills growth across Wales with regard to Solar PV development activities.
- 6.4.11 The proposed development would contribute to The Vale of Glamorgan's renewable energy targets, allowing The Vale of Glamorgan to become more self-reliant and resilient.
- 6.4.12 National, regional and local economic growth policy refers to Wales being well positioned to support the renewable sector, attract investment and reduce carbon emissions.
- 6.4.13 One of the Welsh Government's key priorities is for low carbon electricity to become the main source of energy in Wales. Not only is this a reaction with the Welsh Government setting out its legal commitment to achieve net zero emissions by 2050,

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<sup>10</sup> [energy-generation-in-wales-2019.pdf \(gov.wales\)](#)


but also a realisation that renewable and low carbon energy developments offer significant potential for communities and small businesses.

- 6.4.14 Of national concern is the significant economic leakage because of the current energy system. There is a need to create an energy system that retains more of the economic value for Wales. Through localised production more benefits can be directed to the local communities through skills, quality jobs and a greater retention of economic value.
- 6.4.15 Therefore, the proposed development would contribute to local and regional economic growth aspirations, whilst also providing progress in meeting renewable energy targets.
- 6.4.16 Across the lifecycle of the project a range of skills and training are required. There will be numerous entry points for employment across the different phases of construction and throughout the operational period of the proposed development. Many skills will be transferable from other industries although training will be required to take on many of the roles which will be created.
- 6.4.17 The proposed development could potentially generate numerous socio-economic and economic benefits throughout the 40-year lifespan.
- 6.4.18 The Proposed Development will deliver multiplier economic and socio-economic benefits throughout its lifecycle. The solar farm will have a maximum export capacity of 50MW generating enough electricity to power over 20,400 homes per year and offset approximately 20,200 tonnes of CO<sub>2</sub> every year, the equivalent of taking over 5,000 cars off the road. The BESS will deliver significant environmental benefits, enabling technology for renewable generation, replacing the required for gas fired power generation and providing rapid response power to satisfy peak demand. In performing these roles the development has the ability to reduce carbon dioxide emissions by over 20,600 metric tonnes annually whilst also providing electricity storage equivalent to supplying over 20,800 homes<sup>11</sup>.
- 6.4.19 It is anticipated that the development will employ approximately 80 people during the 6-month construction phase, followed by approximately half a dozen operational and maintenance staff over the 40-year lifespan. The labor force employed throughout the initial six-month construction stage would likely spend in the local economy.
- 6.4.20 Employment onsite would support local business through daily expenditure and also any works accommodation required for the temporary period. The proposed development could also allow local business to operate on clean energy. Allowing them to market themselves as low carbon businesses. It could be particularly attractive to investors, clients and the tourism market.
- 6.4.21 The proposed development offers the opportunity to build awareness of the energy sector and expand the knowledge network through potential collaboration with local schools and colleges.
- 6.4.22 There will also be benefits to the landowners that accommodate the proposal by diversifying their agricultural business and in turn supporting the rural economy.

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<sup>11</sup> Internal calculations using OFGEM Typical Domestic Consumption Values and BEIS Carbon Conversion Factors

6.4.23 Whilst the above is considered a positive for the local area, given the relatively short construction phase it is unlikely to have a major significant effect on the social or economic well-being of the vicinity. The potential effects on the social and economic fabric of the area is not considered to be significant and the topic has therefore been scoped out.



## **7. LANDSCAPE AND VISUAL IMPACT**



## 7.1 INTRODUCTION

- 7.1.1 This chapter sets out the assessment of the landscape and visual impact of the proposed development. It presents the findings of a Landscape and Visual Impact assessment (LVIA) which conforms to the relevant parts of the Guidelines for Landscape and Visual Impact Assessment, Third Edition (Landscape Institute and IEMA, 2013). The assessment focuses on the identification of likely 'significant' landscape and visual effects, including those that are, positive and negative, direct and indirect, long, medium and short term, and reversible and irreversible, as well as cumulative effects. This includes the potential effects on local landscape character and landscape designations, as well as the potential effects on views experienced by people (receptors) including (but not limited to); settlements, Public Rights of Way, registered parks and gardens and transportation corridors.
- 7.1.2 This chapter outlines the data gathering methodology that was adopted for the LVIA. It then leads to a description of the assessment methodology, the overall baseline conditions, and an assessment of potential effects. The chapter concludes with a summary of the assessment results.
- 7.1.3 The main objectives of the LVIA, in relation to this development, are as follows:
- To identify, evaluate and describe the current landscape character of the site and its local surroundings and any notable individual landscape elements within the site;
  - To determine the sensitivity of the landscape to the type of development proposed;
  - To identify potential visual receptors (i.e. people who would be able to see the development) and evaluate their sensitivity to the type of changes proposed;
  - To identify and describe any effects of the development in so far as they affect the landscape and/or views of it and to evaluate the magnitude of change due to these effects; and
  - To assess the effects of the development in consideration of the scale (significance in EIA) of potential effects assessed, mitigation proposals identified and the residual effect (with mitigation in place) and to demonstrate the effectiveness of the mitigation proposed.

### Scheme Description Summary

- 7.1.4 This LVIA has been prepared on behalf of Sirius Renewable Energy (the "Applicant") to accompany a planning application for the construction, operation and decommissioning of a solar farm and Battery Energy Storage System (BESS) across a total area of approximately 127ha. The proposed development encompasses three parcels of land (known as Development Areas) which are located to the west and east of A4226 (Five Mile Lane), approximately 750m to the south of the villages Bonvilston and St Nicholas. The Application Site lies c. 12km to the west of Cardiff and is situated within the administrative area of The Vale of Glamorgan in Wales.
- 7.1.5 The Vale of Glamorgan Local Development Plan allocates the majority of the site as a 'Potential for Solar Energy Area'.
- 7.1.6 Drawing No. **SRE1113/02/01** (Doc Ref. 2.01) identifies the site location.

7.1.7 Oaklands solar farm will have an export capacity of circa 50MW of electricity, enough to power nearly 18,200 homes per year and offset approximately 20,000 tonnes of CO<sub>2</sub> every year, the equivalent of taking over 7,800 cars off the road. The Battery Energy Storage System (BESS) will have a capacity to charge, store and export up to 50MVA of electricity to the local distribution network.

#### Local Setting

7.1.8 The proposal is located c. 0.7km to the south of the village Bonvilston, within the Vale of Glamorgan and comprises agricultural land located situated both to the east and west of A4226 (Five Mile Lane). The site location is presented in drawing SRE1113/12/01.

7.1.9 The site area under consideration measures approximately c.127ha, c.2.7km wide in site extents extending east to west. The site and surrounding areas are rural in nature, characterised by arable and pasture farmland, established hedgerows and woodland blocks. The site area generally gently slopes between c.45m aod and c.93m aod. There are three overhead power lines and associated pylons / poles that run across the site, the pylons lines pass throughout the whole area on an east to west alignment.

7.1.10 The villages of Bonvilston and St Nicholas are the closest villages at approximately 0.7km north and approximately 0.6km north east, respectively. Access to the proposal site is taken directly from the A4226 via existing field gates.

7.1.11 Oaklands Solar Farm comprises 3 main solar deployment areas linked to the farmland holdings, as shown on Drawing No. **SRE1113/02/02** (Doc Ref. 2.02).

- Development Area 1, Pancross – c.66.2 ha. West of the A4226, large scale farmland for silage haymaking. (DA1)
- Development Area 2, Redlands – c.39.6 ha. East of the A4226. medium scale pastoral farmland. (DA2)
- Development Area 3, Oaklands – c.21.3 ha. West of the A4226. small scale pastoral farmland. (DA3)

#### Study Area

7.1.12 It is accepted practice within LVIA work that the extent of the study area for a development is broadly defined by the visual envelope of the proposed development and the anticipated extent of the visibility based on landform combined with developed and natural features. The potential visibility of the solar farm in certain aspects extends to a c.5 km radius from the perimeter of the proposed development.

7.1.13 Although the potential visibility in some instances extend to 5km, detailed consideration of the landscape and visual effects of the solar farm development areas will be focused to a c.2.5 km study area. The study area was selected for the assessment on the basis of the scale of the proposal; up to 3 m high panels / battery compound and their actual theoretical visibility considering local screening features and the nature of the surrounding topography. The likelihood of the panels being substantially perceptible at distances over 2.5km from the site is considered to be very low. GLVIA, section 5.2, additionally states that a study area should

*“include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner. This will usually be based on the extent of landscape character areas likely to be significantly affected either directly or indirectly”.*

7.1.14 The study area is further refined for each part of the assessment process as follows:

- Landscape Assessment: Landscape assessment with regard to landscape character is restricted to a 5 km radius study area. Emphasis has been placed on assessing the landscape receptors likely to experience significant effects (direct and indirect), those within 2.5 km;
- Visual assessment: This is restricted to a 5km study area as it is only within this area that it is considered that potential significant effects, if any, would occur. The assessment is further guided by the results of the zone of theoretical visibility. Emphasis is placed upon assessing the visual effects of groups of potential receptors considered to have the greatest potential to sustain higher magnitudes of visual change, so a focused study area of up to 2.5km is undertaken, although the viewpoints and identified landscape and recreational receptors consider views from outside this area. Despite a focussed 2.5km study area, it is considered that significant visual effects upon receptors over 1km from the site area would be very unlikely based on local characteristics; and
- Cumulative Assessment: mapping of all solar schemes within the study area, operational, consented and ‘in planning’ will be guided through the production of a cumulative ZTV.

#### Pre-Submission Consultation Relating to LVIA Issues

7.1.15 Sirius Renewable Energy requested a screening direction from the Planning Inspectorate on 10th December 2019 who deemed the proposal EIA development on 13th February 2020.

7.1.16 In May 2021 Sirius Renewable Energy submitted a request for a formal Scoping Direction from PINS Wales under Regulation 33 of the EIA Regulations. PINS issued a Scoping Direction on 28<sup>th</sup> July 2021 (confirming the Landscape and Visual Impact was an environmental topic which should be scoped in to the EIA).

#### Assessment Structure

7.1.17 This chapter is structured as follows:

- Introduction;
- Methodology;
- Policy Context;
- Cumulative Sites;
- Baseline Landscape Conditions;
- Baseline Visual Conditions;
- Scheme Design, Mitigation and Enhancement;
- Assessment of Landscape Effect (including Cumulative);

- Assessment of Visual Effect (including Cumulative)
- Assessment of Viewpoints and Photomontages; and,
- Summary and Conclusions

## 7.2 METHODOLOGY

### Introduction

- 7.2.1 The methodology for this LVIA conforms to the relevant parts of the 'Guidelines for Landscape and Visual Impact Assessment, Third Edition (Landscape Institute and IEMA, 2013)'. The assessment focuses on the identification of likely landscape and visual effects, including those that are, positive and negative, direct and indirect, long, medium and short term, and reversible and irreversible, as well as cumulative effects.
- 7.2.1 Detailed explanation of the methodology including the basis on which judgements have been made on the sensitivity of the receptors, magnitude of change and level of effects is contained within **Appendix 7.1** (Doc Ref. 4.01.7a).
- 7.2.2 The methodology and assessment viewpoints were agreed with the Vale of Glamorgan County Borough Council.
- 7.2.3 For the purposes of clarity, the European Landscape Convention (ELC) (2000), defines the term 'landscape' as:
- "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors".*
- 7.2.4 The ELC confirms that the
- "landscape should be considered as a resource in its own right. It provides an integrated way of conceptualising our surroundings and is increasingly considered to provide a useful spatial framework for thinking about a wide range of environmental, land use and development issues".*
- 7.2.5 The ELC applies to all landscapes; natural, rural, urban and peri-urban areas, including land, inland water and marine areas. It considers landscapes that might be considered outstanding as well as every day or degraded landscapes.
- 7.2.6 Additional guidance has also been taken from the following publications:
- Landscape Institute Technical Guidance Note 02/21 – Assessing landscape value outside national designations, (May 2021);
  - Landscape Institute Technical Guidance Note 06/19 September 2019, Visual Representation of Development Proposals;
  - An Approach to Landscape Sensitivity Assessment – To Inform Spatial Planning and Land Management, Natural England, June 2019;
  - Planning Policy Wales LANDMAP Guidance Note 1: LANDMAP and Special Landscape Areas (2016);
  - Planning Policy Wales LANDMAP Guidance Note 3: (2013);
  - An Approach to Landscape Character Assessment, Natural England, October 2014; and
  - Council of Europe, The European Landscape Convention (2000, ratified 2006)

ETS No. 176.

### Assessment Process

7.2.7 This LVIA assessment has 3 key stages, summarised as follows:

- **Baseline** – gathering of documented information; existing landscape character studies, identification of landscape and visual receptors, scoping of the assessment, agreement of viewpoints and assessment parameters, discussion with relevant consultees and the local planning authority, site visits and initial reporting of design issues with client designer;
- **Design** – Review of initial design and ongoing design iterations following baseline survey, including responses to other specialisms e.g. ecology and cultural heritage. Consideration of mitigation options and enhancement (where appropriate); and,
- **Assessment** – involves of an assessment of the landscape and visual effects of the scheme, involves site and desk-based survey and assessment. Due to the scale of development, site focussed and height above ground level, any cumulative effects are also considered within this stage.

### Landscape and Visual Effects

7.2.8 LVIA is a tool used to identify and assess the effects and significance of change resulting from development on both the landscape as an environmental resource in its own right and on people's views and visual amenity (GLVIA 2013, para 1.1).

7.2.9 Landscape and visual effects are assessed separately within this LVIA.

*“the assessments are known as impact assessments but the European Union Directive refers to assessment of the effects, which are changes arising from the development that is being assessed”. (GLVIA 2013, para 1.15).*

7.2.10 Impact is defined as ‘action being taken’ and the effect is defined as the ‘change resulting from the action’.

7.2.11 Landscape effects are defined as:

*“An assessment of landscape effects deals with the effects of change and development on landscape as a resource. How the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character” (GLVIA 2013 para 5.1).*

7.2.12 Visual effects are defined as:

*“An assessment of visual effects deals with the effects of change and development on the views available to people and their visual amenity. Assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements” (GLVIA 2013 para 6.1).*

### Timescale of Effects

7.2.13 The principal landscape and visual effects, which are reversible, occur during the operational lifetime of the solar farm which will be 40 years, and owing to the size of

the solar arrays, and potential for mitigation screening, the effects of the development will reduce over time. It is expected that any mitigation planting and enhancement areas (hedgerows, trees and woodland blocks) is likely to be retained following the operational lifetime period. Effects during construction, operation and decommissioning are considered.

- 7.2.14 The only receptor likely to experience construction effects that are markedly different to the operational effects is the site itself, which will temporarily take on the character of a construction site. These effects will be short term, different in nature to those experienced once the development is complete, but similar in terms of their magnitude and significance.

#### Seasonal Effects

- 7.2.15 Within the assessment, consideration is given to the seasonal differences in effects arising from the varying degree of screening and/or filtering of views by vegetation that will apply year-round. The assessment considers the visual screening effects that vegetation would provide in both summer and winter months (when deciduous vegetation is not in leaf), and if it is considered that there would be substantial differences in the screening and/or filtering of vegetation between the summer and winter months, it will be stated.

#### Significance - Level of Effect

- 7.2.16 The scheme is EIA development therefore an assessment of significant effects will be undertaken. The significance of effect is determined by consideration of the landscape or visual sensitivity and the magnitude of change.
- 7.2.17 The detailed criteria used to determine the significance of effect is listed in Appendix 7.1 Methodology. As with all LVIA's, it should be noted that while the methodology is designed to be robust and transparent, in line with best practice, professional judgement is finally applied to determine the significance of effects, and whether the effects are considered 'Significant' or 'Not Significant'.

#### Subjectivity of the Nature of Effects

- 7.2.18 This LVIA does not state explicitly whether the effects of the development on landscape and visual amenity is adverse, neutral or beneficial. However, it is acknowledged that the GLVIA 2014 states that professional opinion should be applied and a positive or negative judgement stated (Para 5.37 and 6.29).
- 7.2.19 It is commonly accepted that the nature (or valency) of effects of a development is subjective, based upon the attitude of the individual. The application site is set within a rural area, but large-scale developments such as Cardiff Airport are found locally. The development may be seen as a further landscape detractor; or, be seen as a positive addition to the evolving energy generation role the landscape can play reflecting the need to generate clean renewable energy. In examining visual effects, it is not realistic to ignore public opinion (nor the likelihood that professionally qualified landscape architects may have differing positions) when discussing the effect upon views perceived by the public.
- 7.2.20 In accordance with GLVIA, a precautionary approach is taken and therefore, although the nature of effects is not stated within the assessment, it can be assumed effects

would be negative unless stated otherwise. This precautionary approach of negative effects should be considered with the caveat that the valency of effect must always be considered by the decision makers. The approach should not be concluded to be the final judgement, and it should be acknowledged that many people would see the development as either a positive or neutral addition.

#### Assessment of Limitations

- 7.2.21 The assessment of landscape and visual effects is undertaken from publicly accessible locations only, including roads, parks, common land and Public Rights of Way to represent potential impacts on a range of receptors. Consideration of the effect on views from residential receptors is undertaken from representative publicly accessible points and analysis of map data close to the properties. This assessment does not consider or assess impacts from every theoretical location where the development would be visible. The LVIA does not assess the effects of any necessary electricity connection cables and ancillary works outside of the application boundary.

#### Design Mitigation

- 7.2.22 Mitigation is proposed to prevent / avoid, reduce, offset or remedy potential effects of the proposed development. Mitigation will be considered and referenced in the assessment of effects where applicable.
- 7.2.23 Mitigation has been incorporated in the layout, design and construction of the proposed development to limit its effects. Those that would mitigate potential effects on landscape and visual amenity are considered within this assessment of effects and discussed in Section 7.5.

#### Duration

- 7.2.24 From a landscape and visual assessment perspective, although the proposed development is ultimately temporary and reversible, its effects on the landscape have been considered over its anticipated 40-year lifespan, so generally considered of a permanent nature.

#### Residual Effects

- 7.2.25 Residual effects are defined as the effects remaining after any proposed methods of mitigation have been implemented.
- 7.2.26 The potential for specific residual effects on landscape and visual amenity during the construction and decommissioning phase is limited given the relative short length of these phases and it is considered that the impacts would be less than those experienced during the operational phase. Where this is different the residual effects will be highlighted.

### 7.3 POLICY CONTEXT

- 7.3.1 This section sets out the landscape and visual focussed planning policies and material considerations, which are relevant both to the site and the type of development proposed, giving consideration to National, and local planning policy.
- 7.3.2 Section 38(6) of the Planning and Compulsory Purchase Act 2004 requires

planning applications to be determined in accordance with the provisions of the Development Plan unless material considerations indicate otherwise.

#### Future Wales: The National Plan 2040

7.3.3 Future Wales: The National Plan 2040 (Adopted February 2021) is the national plan that sets the direction of development in Wales to 2040. Applications for Developments of National Significance must be determined in accordance with Future Wales. Policies 17 and 18 contain strategic spatial and detailed criteria-based policies respectively and should be considered together in the determination of applications.

7.3.4 Policy 17 - Renewable and Low Carbon Energy and Associated Infrastructure states:

*"The Welsh Government strongly supports the principle of developing renewable and low carbon energy from all technologies and at all scales to meet our future energy needs. In determining planning applications for renewable and low carbon energy development, decision-makers must give significant weight to the need to meet Wales' international commitments and our target to generate 70% of consumed electricity by renewable means by 2030 in order to combat the climate emergency...."*

*"Proposals should describe the net benefits the scheme will bring in terms of social, economic, environmental and cultural improvements to local communities...."*

7.3.5 Policy 18 – Renewable and Low Carbon Energy Developments of National Significance provides the decision-making framework for renewable and low carbon energy technologies. The Policy states:

*"Proposals for renewable and low carbon energy projects (including repowering) qualifying as Developments of National Significance will be permitted subject to policy 17 and the following criteria:*

*1. outside of the Pre-Assessed Areas for wind developments and everywhere for all other technologies, the proposal does not have an unacceptable adverse impact on the surrounding landscape (particularly on the setting of National Parks and Areas of Outstanding Natural Beauty);*

*2. there are no unacceptable adverse visual impacts on nearby communities and individual dwellings;*

*3. there are no adverse effects on the integrity of Internationally designated sites (including National Site Network sites and Ramsar sites) and the features for which they have been designated (unless there are no alternative solutions, Imperative Reasons of Overriding Public Interest (IROPI) and appropriate compensatory measures have been secured);*



4. *there are no unacceptable adverse impacts on national statutory designated sites for nature conservation (and the features for which they have been designated), protected habitats and species;*
  5. *the proposal includes biodiversity enhancement measures to provide a net benefit for biodiversity;*
  6. *there are no unacceptable adverse impacts on statutorily protected built heritage assets;*
  7. *there are no unacceptable adverse impacts by way of shadow flicker, noise, reflected light, air quality or electromagnetic disturbance;*
  8. *there are no unacceptable impacts on the operations of defence facilities and operations (including aviation and radar) or the Mid Wales Low Flying Tactical Training Area (TTA-7T);*
  9. *there are no unacceptable adverse impacts on the transport network through the transportation of components or source fuels during its construction and/or ongoing operation;*
  10. *the proposal includes consideration of the materials needed or generated by the development to ensure the sustainable use and management of resources;*
  11. *there are acceptable provisions relating to the decommissioning of the development at the end of its lifetime, including the removal of infrastructure and effective restoration.*
- The cumulative impacts of existing and consented renewable energy schemes should also be considered".*

#### Planning Policy Wales Edition 11

- 7.3.6 The Welsh government published the revised Planning Policy Wales Edition 11 (PPW) in February 2021 which forms the overarching national level source of planning policy for Wales. It seeks to support the requirement for sustainable development via the planning system whereby the "presumption in favour of sustainable development" forms the overarching role.
- 7.3.7 Chapter 6, Recognising the Special Characteristics of Places is the most relevant to this LVIA. Paragraph 6.3.3 states that:

*Considering landscape at the outset of formulating strategies and policies in development plans and when proposing development is key to sustaining and enhancing their special qualities, and delivering the maximum well-being benefits for present and future generations as well as helping to deliver an effective and integrated approach to natural resource management over the long term. Collaboration and engagement with adjacent planning authorities, Natural Resources Wales (NRW), Cadw and the third sector will be necessary to draw on a wide range of expertise and evidence. This means:*

- *Ensuring Wales contributes to meeting international responsibilities and obligations for landscapes*
- *Ensure statutory and non-statutory designated sites are properly protected and managed;*
- *Ensuring that the value of all landscapes for their distinctive character and special qualities is protected; and*
- *Ensuring the opportunities landscapes provide for tourism, outdoor recreation, local employment, renewable energy and physical and mental health and well-being are taken into account and multiple well-being benefits for people and communities secure.”*

### Local Planning Policy

7.3.8 The Vale of Glamorgan County Borough Council Local Development Plan (LDP) was adopted in June 2017 and provides the overarching strategic planning framework for the county area to 2026.

7.3.9 As Future Wales is the national, and highest, tier of development plan in Wales, local development plans are required to be in accordance with it. S38(5) of the Planning & Compulsory Purchase Act confirms that:

*"If to any extent a policy contained in a development plan for an area conflicts with another policy in the development plan the conflict must be resolved in favour of the policy which is contained in the last document".*

7.3.10 For this application, the last document is Future Wales.

7.3.11 The key policies relating to sustainable development and renewable energy at the local level are:

- Policy SP10 – Built and Natural Environment
- Policy MG17 – Special Landscape Areas
- Policy MG30 – Local Search Areas for Solar Energy
- Policy MD1 – Location of New Development
- Policy MD2 – Design of New Development
- Policy MD89 – Promoting Biodiversity
- Policy MD19 – Low Carbon and Renewable Energy Generation

7.3.12 Each of the above policies are detailed below.

7.3.13 **Policy SP10 – Built and Natural Environment** is a strategic policy in relation emphasises the need to protect the Vale of Glamorgan’s natural and built environmental assets and reinforces that sensitive design and choice of location of new development can have a positive effect. It states that:

*“Development proposals must preserve and where appropriate enhance the rich and diverse built and natural environment and heritage of the Vale of Glamorgan including:*

- 1. The architectural and / or historic qualities of buildings or conservation areas, including locally listed buildings;*
- 2. Historic landscapes, parks and gardens;*
- 3. Special landscape areas;*
- 4. The Glamorgan Heritage Coast;*
- 5. Sites designated for their local, national and European nature conservation importance; and*
- 6. Important archaeological and geological features.”*

7.3.14 With regard to Policy SP10 and LVIA: The LVIA will consider the potential effects of the new development, specifically with regards to the SLA.

7.3.15 **Policy MG17 – Special Landscape Areas** is a specific policy to the protection of the designated Special Landscape Areas, which states that:

*“The following areas are designated as special landscape areas:*

- 1. Castle Upon Alun;*
- 2. Upper & Lower Thaw Valley;*
- 3. Ely Valley & ridge slopes;*
- 4. Nant Llancarfan;*
- 5. Dyffryn basin & ridge slopes;*
- 6. Cwrt-yr-Ala basin.*

*Within the special landscape areas identified above, development proposals will be permitted where it is demonstrated they would cause no unacceptable harm to the important landscape character of the area.”*

7.3.16 With reference to Policy MG17 and the LVIA, the qualities of the SLA will be reviewed and consideration given to the scale of effect. It is though noted that large areas of the site are set within Policy MG30, within the wider SLA area, indicating areas of the SLA of a lower sensitivity to solar development.

7.3.17 **Policy MG30 – Local Search Areas for Solar Energy** is one of the most directly relevant policy to the proposed development. It states that:

*“Local search areas for solar energy are shown on the Proposals map. In these areas proposals for solar energy generation schemes up to 50 mw will be permitted provided there are no unacceptable effects on amenity, heritage assets or the environment.”*

#### **Search Area 3 – Land West of Five Mile Lane**

*This search area measures approximately 86 hectares and is located to the west of the A4226 (Five Mile Lane) and south of*

*Bonvilston and lies in the open countryside. The search area is located within the Nant Llancarfan Special Landscape Area where detailed development proposals will need to carefully consider the extent of landscape and visual impacts. The identified solar energy resource in this area adjoins a number of other potential constraints that will need consideration in the preparation and assessment of detailed proposals. In addition, a Scheduled Ancient Monument (Ty'n-y-Coed castle ringwork) and boundary of the Llancarfan Landscape of Outstanding Historic Interest lay in close proximity to the north and south west of the search area respectively.*

7.3.18 With regards to Policy MG30 and the LVIA, it is noted that large areas of the site are set within the solar search area, therefore according with this locational policy, although the assessment will consider the overall level of effects.

7.3.19 **Policy MD1 – Location of New Development** is a strategic policy which sets out the framework for future development to take place on unallocated sites within the Vale of Glamorgan. It states that:

*“New development on unallocated sites should:*

*1. Have no unacceptable impact on the countryside;*

*9. Have no unacceptable impact on the best and most versatile agricultural land.”*

7.3.20 With regard to Policy MD1 and the LVIA, the assessment will seek to establish impacts upon the countryside.

7.3.21 **Policy MD2 – Design of New Development** is the Council's strategic policy in relation to the key principles that developers should consider in respect of design, amenity and access which together contribute to attractive, safe and accessible environments. It states that:

*“In order to create high quality, healthy, sustainable and locally distinct places development proposals should:*

*1. Be of a high standard of design that positively contributes to the context and character of the surrounding natural and built environment and protects existing features of townscape or landscape interest;*

*2. Respond appropriately to the local context and character of neighbouring buildings and uses in terms of use, type, form, scale, mix, and density;*

*... 8. Safeguard existing public and residential amenity, particularly with regard to privacy, overlooking, security, noise and disturbance;*

*... 10. Incorporate sensitive landscaping, including the retention and enhancement where appropriate of existing landscape features and biodiversity interests;*

*... 12. Mitigate the causes of climate change by minimising carbon and other greenhouse gas emissions associated with their design, construction, use and eventual demolition, and include features that provide effective adaptation to, and resilience against, the current and predicted future effects of climate change.”*

7.3.22 With regard to Policy MD2 and the LVIA, the scheme design and mitigation proposals will be undertaken with reference to this policy.

7.3.23 **Policy MD89 – Promoting Biodiversity** is a permissive, criteria-based policy which seeks to enable appropriate proposals in line with biodiversity conservation. It states that:

*“New development proposals will be required to conserve and where appropriate enhance biodiversity interests unless it can be demonstrated that:*

*1. The need for the development clearly outweighs the biodiversity value of the site; and*

*2. The impacts of the development can be satisfactorily mitigated and acceptably managed through appropriate future management regimes.”*

7.3.24 With regard to Policy MD89 and the LVIA, the scheme mitigation proposals will seek to promote biodiversity, produced in parallel with the ecological assessment.

7.3.25 **Policy MD19 – Low Carbon and Renewable Energy Generation** is the Council's strategic policy in relation to renewable energy. It states that:

*“Proposals for the generation of low carbon and renewable energy will be permitted where it can be demonstrated that there is no unacceptable impact on the interests of:*

*Best and most versatile agricultural land;*

*Aviation safeguarding;*

*Electrical, radio or other communication systems;*

*Landscape importance;*

*Natural and cultural heritage;*

*Nature conservation;*

*Residential amenity; and*

*Soil conservation.*

*In assessing such proposals, the cumulative impacts of renewable energy schemes will be an important consideration. Where necessary, proposals should be informed by a landscape and visual impact assessment.*

*Favourable consideration will be given to proposals that provide opportunities for renewable and low carbon energy and / or heat generation to be utilised within the local community.”*

- 7.3.26 With regards to Policy MD19 and the LVIA, the assessment will seek to establish that there will be no unacceptable impacts on the listed interests.

Technical Advice Note 5 (TAN5): Nature Conservation and Planning (2009)

- 7.3.27 TAN 5 provides advice on planning nature conservation in relation to development proposals. TAN 5 outlines support will be given to development if it can retain and enhance the local landscape, paragraph 3.2.2 states:

*“Sensitive landscaping and planting, the creation, maintenance and management of landscape features important to wildlife, and the skilled adaption of derelict areas can provide extended habitats.”*

- 7.3.28 TAN 5 outlines support will be given to development if it can be proven there is little to no demonstrable harm to local biodiversity conservation, paragraph 1.4.4 states:

*“Section 40(1) of Natural Environment and Rural Communities Act 2006 (NERC) places a duty on every public authority, in exercising its functions, to “have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.*

- 7.3.29 TAN 5 further outlines the importance of biodiversity in paragraph 1.5.1:

*“Biodiversity is an important indicator of sustainable development. Biodiversity and geodiversity add to the quality of life and local distinctiveness”.*

- 7.3.30 Stated within paragraph 1.6.1:

*“Biodiversity conservation and enhancement is an integral part of planning for sustainable development.”*

- 7.3.31 Local and National planning policies are further appraised in the Planning Statement (Doc Ref: 3.01) submitted with the application.

## 7.4 LANDSCAPE ASSESSMENT – BASELINE CONDITIONS

- 7.4.1 An overview of the existing landscape for both the application site and the wider study area as a whole has been determined by observations made during site visits and review of the published Landscape Character Assessments (LCA).

- 7.4.2 It follows from the above that in order to assess whether landscape character is ‘significantly’ affected by a development, it should be determined what and how each of the key characteristics would be affected. The judgement of magnitude therefore reflects the degree to which the key characteristics and elements which form those characteristics will be altered by the proposals. The scale of the development, the nature and sensitivity of the receiving landscape, and local ‘barriers’ in the landscape (such as breaks of topography, woodlands,

settlements, and roads or rivers) will influence the exact extent of effect of the development.

### National Landscape Character

#### Wales National Landscape Character Area

- 7.4.3 The National Landscape Character Areas (NLCA) undertaken by National Resources Wales (NRW) form the broadest scale of landscape character assessment in Wales. The NLCAs are defined at a broad landscape scale and the descriptive profiles for the 48 individual character areas highlight what distinguishes one landscape from another, with reference to their regionally distinct natural, cultural and perceptual characteristics.
- 7.4.4 Within the study area, the proposed development is contained within NLCA 36 Vale of Glamorgan. NCL36 Summary description of relevance to the study area:

*The Vale is a distinctive, gentle lowland landscape, largely comprising a rolling limestone plateau. Glacial till contributes to its undulating topography. A variety of rural land uses characterise the area, reinforced by thick hedgerows, frequent small woodlands and trees, which create a sense of enclosure and intimacy. This is despite the proximity to large towns such as greater Cardiff, Barry and Bridgend, and a number of large built features within the Vale...*

*In the centre of the Vale, compact and historic settlements reinforce the area's distinctive sense of place, but with limited modern development. Yet the area has attracted many professionals, who commute to Cardiff and Bridgend, adding to the more prosperous character of places like Cowbridge and Llanblethian.*

*The area's historic character was shaped by Anglo-Norman influences. Norman castles and medieval villages centred on churches are key features. The registered landscape of Llanancarfan is astoundingly beautiful as well as being a relatively unspoiled gem of historical evolution. All this is despite the relatively close proximity to nearby large towns.*

- 7.4.5 Key characteristics of NLCA 36 of relevance to the study area:

- *Lowland, rolling limestone plateau with glacial till.*
- *Mixed agricultural land uses - with predominantly rural character*
- *Small woodlands – mainly to the east. Few large woods.*
- *Mixed field patterns and sizes - with hedgerows and hedge banks, frequent hedgerow trees.*
- *Limestone walls define land above the cliffs in the west. Norman castles and medieval villages centred on churches.*
- *Predominantly still rural - with strong senses of enclosure by historic field boundaries.*
- *Commuter settlement - modern suburban housing extending but contrasting with historic settlement character.*

7.4.6 Visual sensory Profile characteristics of relevance to the study area:

- *Distinctive plateau landscape, dissected by a number of rivers including the Ely, Thaw and Waycock. It still evokes a strong rural sense of place with a patchwork of fields, hedgerows and woodlands and trees and extensive open, lowland, farmland*
- *Further inland, the Bonvilston ridge forms a strong landscape element running across the centre of the Vale, reflected in views southwards across the Vale and northwards and into the South Wales Valleys.*

Landmap

- 7.4.7 LANDMAP (Natural Resources Wales) details the Welsh national level approach to landscape assessment. It is a GIS (Geographical Information System) based landscape resource where landscape characteristics, qualities and influences on the landscape are recorded and evaluated into a nationally consistent data set.
- 7.4.8 LANDMAP is formally recognised in Planning Policy Wales (PPW) as the starting point for landscape assessments in Wales. LANDMAP provides information for all of Wales' landscapes apart from the built-up areas of Cardiff and Swansea. LANDMAP GN 46 discusses the use of LANDMAP in LVIA, Planning Policy Wales (para. 6.3.20) also advocates the use of LANDMAP assessments to inform development management decisions, landscape character assessment, design and landscape sensitivity studies. LANDMAP is used to inform a thorough understanding of the landscape baseline from nationally mapped set of datasets.
- 7.4.9 LANDMAP Information is defined by five methodological chapters: Cultural Landscape, Geological Landscape, Historic Landscape, Landscape Habitats and Visual & Sensory. These chapters are considered the key national level landscape guidance for Wales. LANDMAP, as the most comprehensive landscape resource, will be utilised in this assessment.
- 7.4.10 LANDMAP does not specifically discuss solar farm development however Guidance Note 3 discussed the scale of the study area and Aspect Areas to be considered when assessing wind turbine development. Whilst solar is a large scale renewable development the vertical scale of the development types, and surface area required, is substantially different. As such, the approach to the assessment of Aspect Areas is used as a guide only, and the following is considered appropriate for this assessment. With regard to Table 1 within LANDMAP Guidance Note 3, the following aspect and study area radius have been considered:



Table 7.1: Approach to Aspect Areas

Aspect	Search area defined by aspects which:	Typical study area radius dependent on wind farm and turbine size and location	Evaluation of aspect areas which should be main focus of study	Useful thematic maps to inform study (can be overlaid with ZTV)
<b>Geological Landscape</b>	Contains site boundary and those adjacent	Site area	Outstanding and high overall evaluation	Overall evaluation and rarity / uniqueness evaluation criteria
<b>Landscape Habitats</b>	Contains site boundary and those adjacent	1 km	Outstanding and high overall evaluation	Overall evaluation and connectivity / cohesion criteria
<b>Visual and Sensory</b>	Areas inter visible with development	2.5 km	Outstanding and high overall evaluation. Plus moderate evaluation (where scenic quality and/or character criteria are outstanding or high).	Overall evaluation and scenic quality and character evaluation criteria
<b>Historic Landscape</b>	Areas inter visible with development	1 km	Outstanding and high overall evaluation	Overall evaluation
<b>Cultural Landscape Services</b>	Areas inter visible with development	Site and immediately adjoining areas	Outstanding and high in rarity and group value evaluation criteria	Overall evaluation and rarity and group value evaluation criteria

### Site Level (Visual Sensory)

- 7.4.11 The site is located within 3 LANDMAP ‘visual and sensory’ Aspect Areas. The visual sensory layer is disused within this document (as considered the most relevant to LVIA) however the assessment will consider all the different Aspect Areas (within Appendix 7).
- 7.4.12 The majority of the site is located within VS146: Central Vale Ridges and Slopes, a smaller area to the east (an area of Redlands) is located within VS608: Upper Waycock Valley/Dyffryn Area, and a small area upon the site’s western and south western boundaries (Oaklands and Pancross areas) is located within VS453: Llancarfan and

Waycock Valley.

7.4.13 Key discussion points relating to the Aspect Areas:

VS146 - Central Vale Ridges and Slopes

*The area is a rolling lowland, which may be described as a plateau, that is dissected by the Thaw and Nant Llancarfan valleys. The plateau landform offers wide views towards the Bristol Channel and Somerset and feels exposed to the wind and elements. The land slopes southwards with the highest point at approximately 115m AOD to the north east around Pentre Farm and the lowest point at approximately 25m AOD near East Aberthaw. The landcover is dominated by a medium to large field pattern, mainly pasture set in managed hedgerows. The area is mainly open but there are some clumps of woodland both coniferous and deciduous. These are concentrated towards the west and north east, generally situated on hill tops or steeper slopes where they can be seen from long distances. Settlements consist of farms and hamlets scattered evenly throughout the area. Several minor roads cross the area and the A4226 runs close to the eastern boundary affecting tranquillity in this vicinity.*

**Overall Evaluation Criteria: Moderate**

*The aspect area offers many views to hedgerows, fields, and treed areas in harmonious composition. However the flat nature of the aspect area's landscape (level plateau) makes for a less pleasing composition of elements than the more undulating or hilly areas. The integrity of the area has been affected by erosion of hedgerows in places. The area has a sense of place defined in part by its visual relationship with the sea although intrinsically the area does not have a strong character. The area contains many elements typical and representative of the Vale.*

VS608 Upper Waycock Valley / Dyffryn Area

*The upper Waycock Valley is a broad gently sloping valley traversed by several minor watercourses. The landcover is a mosaic of mostly pastoral fields with some arable enclosed by trimmed hedgerows with trees. Woodlands are dispersed throughout the area, generally on upper valley slopes and spurs. Settlement is centred on Duffryn, which is an attractive village of stone dwellings, stone walls and a stream running alongside the road. Dyffryn Gardens are a formal designed gardens nearby, with an improved access to the road to the A48 to the north. Farms and occasional dwellings are scattered across the area. These are linked by quiet minor roads and a network of public footpaths and generally the area is tranquil. However, the area borders Barry to the south east as well as the A4226, hence tranquillity is affected here. In general the rural landscape is well maintained and the farms and settlements maintain their character. Detractors are pylons which cross the area to the south and the prominent edge of Barry on the hill top to the south.*

**Overall evaluation criteria: High**

*The aspect area has broad, pleasing views to well managed countryside with a coherent field pattern and woodlands with settlements well integrated with the landscape and surrounding vegetation. . The settlements have stone walls and streams also add to the picturesque quality of this area. The area is unspoilt, well managed and is in good and*

*consistent condition throughout. The overall evaluation for the area is therefore high.*

#### VS453 Llancarfen and Waycock Valley

*The area is a steep sided narrow and enclosed lowland valley, which contains a tranquil landscape of streams, woodlands and small farms. The highest point of the valley is approximately 85m AOD in the north west, the lowest approximately 5m AOD near the village of Llancadle. The landcover of the valley is a mosaic pattern of pastoral fields and hedgerows, the latter often containing trees and there are substantial areas of woodland. The woodland areas are generally situated on the steeper upper slopes of the valley sides and assist in creating a confined sense of enclosure to the valley. The settlements of the area consist of a number of scattered farms and the village of Llancarfan. Several minor road cross the area, which tend to be centred on Llancarfan. However the area remains tranquil. The Llancarfan and Waycock Valleys are a well maintained landscape of unspoilt hedgerows and fields, conservation area villages and steep wooded valley sides. The power lines in the Waycock valleys are a detractor.*

**Overall evaluation criteria: High**

*The aspect area possesses a high quality scenic landscape with many picturesque views to fields, hedgerows and steeply wooded valley sides in an aesthetic composition. The integrity of the area is intact with consistent character and no inappropriate development within the settlements. The power lines in the Waycock do not mask the areas intrinsic qualities. The integrity of the area is also maintained within the rural landscape where hedgerows are maintained. The aspect area possesses a distinctive character defined by the strong enclosing topography, historic settlement pattern and features, woodland cover all creating a strong sense of place. The narrow enclosure and continuity of historic character are relatively rare.*

7.4.14 With regard to the study area, the proposed development and LANDMAP Aspect Areas are illustrated on (all included in Appendix 7.3 to this ES):

- Figure 7.5 Landmap Visual and Sensory
- Figure 7.6 Landmap Geological Landscape
- Figure 7.7 Landmap Landscape Habitats
- Figure 7.8 Landmap Historic Landscape
- Figure 7.9 Landmap Cultural landscape

7.4.15 The proposed development is located within the following LANDMAP Aspect Areas:

- Visual and Sensory Areas (VSA)
  - Development Areas (DA's) 1,2 and west side of Area 3: VLFGLVS146 Central Vale Ridges and Slopes **Moderate evaluation.**
  - Southern and Western portion of Development Areas (DA's) 3 and 1: VLFGLVS453 Llancarfan and Waycock Valleys **High evaluation**
  - Eastern half of Development Area (DA) 2: VLFGLVS271 St Nicholas and Bonvilston Ridge Crest **High evaluation.**

- Geological Landscape:
  - DA's 1 and 3: VLFGLGL170 Moulton **Moderate evaluation.**
  - DA 2 and a small area of the western fringe of DA1 is within VLFGLGL282 St. Hilary. **High evaluation**
  - A very small area on the east of DA2 is set within VLFGLGL749 Wenvoe. **High evaluation.**
  - A very small area on the western fringe of DA 1 is located within VLFGLGL514. **Medium evaluation.**
- Landscape Habitats:
  - DA's 1 and 3: VLFGLLH582 Ogmre-Llantwit Arable Belt. **Moderate Evaluation.**
  - DA 2: VLFGLLH958 Barry North. **Moderate Evaluation.**
  - A very small part of DA 3 is within VLFGLLH786 Aberthaw River Valleys. **High Evaluation.**
- Historic Landscape:
  - DA's 1 and 3: VLFGLHL032 Llancarfan. **Outstanding Evaluation**
  - DA 2: VLFGLHL050 Dyffryn. **Outstanding evaluation.**

Outstanding and High evaluation Aspect Areas within 1km:

  - VLFGLHL027 Dyffryn Gardens. **Outstanding Evaluation** (No intervisibility with DA's located 500m+ to the southeast)
  - VLFGLHL022 A48 Lougher to Chepstow communication co. **Outstanding Evaluation** north of the 3 DA's.
  - Small area of VLFGLHL054 Llangan Welsh St Donats and Pendoylan lies to the north of A48 and the villages St Nicholas and Bonvilston but extremely limited opportunities for inter visibility.
- Cultural Landscape Services:
  - DA's 1,3 and west side of DA 2: VLFGLCLS008 Central Vale Ridges and Slopes –
    - Sense of place/ local distinctiveness: Weak.
    - Visual and sensory landscape evaluation: Moderate.
    - Scenic quality: High.
    - Character: High.
    - Landscape Habitats Evaluation: Over 75% High or Outstanding, Historic Landscape evaluation: Over 75% High or outstanding.
  - Small part of DA 1 and 3: VLFGLCLS027 Llancarfan and Waycock Valleys will have limited bearing on site:
    - Sense of place/ local distinctiveness: Strong.
    - Visual and sensory landscape evaluation: High.
    - Scenic quality: High.
    - Character: High.
    - Landscape Habitats Evaluation: Over 75% High or outstanding, Historic Landscape evaluation: Over 75% High or outstanding.
  - East half of DA 2: VLFGLCLS036 Upper Waycock Valley/Dyffryn Area

- Sense of place/ local distinctiveness: Moderate.
  - Visual and sensory landscape evaluation: High.
  - Scenic quality: Moderate.
  - Character: High. Landscape Habitats Evaluation: Over 75% Moderate, Historic Landscape evaluation: Over 75% High or outstanding
  - Outstanding and High evaluation Aspect Areas within 1km:
    - Aspect areas not classified.
- 7.4.16 The referenced Aspect Areas are discussed in detail in **Appendix 7.2** (Doc Ref. 4.01.7b).

#### Regional Landscape Character - Landscapes Working for the Vale of Glamorgan

- 7.4.17 The Vale of Glamorgan Council supported by the then Welsh Development Agency, published a landscape strategy for the Vale in 1999. The Landscape Character Area boundaries broadly follow the Visual Sensory Aspect Area boundaries. The site is located predominantly within LCA 16: Central Slopes and Valleys (DA's 1 and 3) but the eastern area (DA2) is located within LCA 22: Dyffryn Area.
- 7.4.18 LCA 16 is described as 'well-kept farmland and substantial woodland blocks with scattered settlements of farmhouses and historic settlements. Long views of coast possible'. The area has a 'moderate' visual evaluation.
- 7.4.19 LCA 22 is described as, 'Broad gentle sloping valley running from limestone ridge south towards lower Waycock reaches and overlooked by northern edge of Barry. Arable and pastoral farmland with trimmed hedges, blocks of woodland, scattered settlement focussed on Dyffryn village. Dyffryn Gardens is a local attraction. The area has high value particularly attached to visual and cultural aspects, but also to historical. The area has a 'high' visual evaluation.
- 7.4.20 The boundaries of the LCAs are illustrated on Figure 7.9, Landscape Character, Regional (included in **Appendix 7.3**, Doc Ref. 4.01.7c to this ES).

#### LAC 16, Central Slopes and Valleys

- 7.4.1 Sections of the LCA description relevant to this assessment and DAs include:
- “South facing slopes of limestone ridge, Nant TreGof valley and southerly extending ridge fingers. Well-kept farmland and substantial broad leaf woodland blocks with scattered settlement of farmhouses and historic settlements [and conservation areas] of St Hilary and Llantrithyd. Long views of coast possible”*
- 7.4.2 It is noted the extending ridges within the rolling, undulating landscape create subtle variations in aspect to the various parts of the Development Areas. Land in DA 1 'Pancross' forms a gentle central ridge, from which slopes face north towards Bonvilston before dipping down to the southern field boundary. Land then gently rises to the edge of Oaklands area, DA 3 set in front of one of the woodland blocks which follows the ridge extending to the southwest towards Llancafarn. Land within DA 2 'Redlands' (a transition zone to LCA 22) is more enclosed by small woodland blocks and trees set within old (and lost) hedgerows, in smaller scale pasture fields that are on more typically south east facing slopes in contrast to the elongated fields of DA 1 currently in arable use.

- 7.4.3 The LCA highlights the following key strategies which will be considered in the assessment of effects section:

*'An Unspoilt rural area between main valleys with consistent historical value.'*

Visual:

*Encourage appropriate rural detailing of hedgerows and protection and ongoing management of woodlands possibly supported by Tir Gofal. Rural settlement and farm building guidelines needed. Restriction of development particularly on prominent slopes and ridges*

Geology, Landforms and Drainage:

*Protect aquifer with appropriate land management. Encourage buffer strips.*

Vegetation and Habitats:

*Protect areas of interest by designation. Protect and manage hedges, stone walls, grassland, roadsides, woodlands, streams [e.g.buffer strips].*

Historical:

*Need for archaeological landscape characterisation study and historic settlement study. Historic interest needs to be weighed against development and subsequent consideration of historic landscape status and management review.*

Cultural:

*Protect historic buildings/conservation areas/Village cores and their settings. Carry out detailed cultural associations study. Subtle interpretation of local features desirable.*

#### LAC22, Dyffryn Areas

- 7.4.4 Sections of the LCA description relevant to this assessment and DA 2 include:

*'Broad gentle sloping valley running from limestone ridge south towards lower Waycock reaches and overlooked by northern edge of Barry. Arable and pastoral farmland with trimmed hedges, blocks of woodland, scattered settlement focussed on Dyffryn village. Dyffryn Gardens are a local attraction. The area has high value particularly attached to visual and cultural aspects, but also to historical. The issue of highly visible encroachment of development onto the steep slopes north of Barry needs to be addressed. Power lines are also a detractor in southern part of valley.'*

- 7.4.5 It is noted the character description largely relates to land to the east of the site towards the settlement of Dyffryn inclusive of Dyffryn Gardens RPG, and small to medium arable and pasture farmland subdivided by woodland blocks. The area of LCA 22 covered by DA 2 is a more transitional zone, sharing characteristics of LCA 16. It is nevertheless noted that woodland within this landscape provides the background setting, largely enclosing DA 3 assisting with screening views from the east and south east.

- 7.4.6 The LCA highlights the following key strategies which will be considered in the assessment of effects section:

Visual:

*'Maintain rural character of area by support by Tir Gofal where applicable maintaining field patterns/boundaries, farm management, woodland management, riparian vegetation. Restrict development particularly in relation to the expansion of Barry or related development or from the A48. Implement rural settlement and farm guidelines.'*

Geology, Landforms and Drainage:

*Maintain natural river course and protect water quality.*

Vegetation and Habitats:

*Suitable land management of areas around riparian corridors including buffer zones] and woodlands using Tir Gofal/Woodland grants. Maintain/improve high water quality of river. Consider further designation of areas.*

Historical:

*Important historic landscape with need for archaeological landscape characterisation study and historic settlement study. Historic interest needs to be weighed against development and subsequent consideration of historic landscape status needed and management review.*

Cultural:

*Protect Dyffryn Gardens, its setting and approaches to retain character of this part of the Vale. Carry out detailed cultural associations study. Subtle interpretation of local features desirable.*

- 7.4.7 The character and sensitivity of the combined DAs is considered to be generally as outlined within the Landmap Studies and Landscape Character Assessments, however, the sites Individual characteristics will be assessed further against the characteristics and conclusions of the study, with an assessment of landscape value and susceptibility to change undertaken within the following section.

#### Local Landscape Character

- 7.4.8 An overview of the existing landscape elements and features of the site and the study area has been determined by observations made during site visits and through review of the LANDMAP classification information and Regional LCA. The local landscape of the site, and its immediate surroundings, is covered by a local landscape designation, a Special Landscape Area, however large areas of the site are also set within a 'Local Search Area for Solar Energy'. Local landscape character is considered in detail at a site level and within a focussed study area.
- 7.4.9 It is noted that part of the site, the western edge of DA 1 is within an Area of Outstanding Historic Landscape. The study area is also covered by 4 Special Landscape Areas. These are regional level designations within the Vale of Glamorgan and are commonplace, covering much of the rural landscape between settlements. Therefore, whilst these landscapes will have greater susceptibility to change than non-designated or locally designated areas, it does not necessarily preclude development of the type proposed if it can be demonstrated that areas within them are less susceptible to change and could accommodate development. The western half of site areas DA 1 and DA 3 are within Nant Llancarfan SLA.

- 7.4.10 It is noted that these areas are also within the aforementioned Local Search Area for Solar Energy. It is therefore reasonable to assume that these areas are to be considered less susceptible to landscape and visual changes as a result of solar development than other more sensitive areas with the SLA's. The more sensitive parts of the SLA's are generally located away from the proposed Development Areas and including; the historic setting around Llancarfan and distinctive valley enclosures surrounding the village, the characterful ridge above Bonvilston and St Nicholas and the intact small scale pastures and setting of Dyffryn Registered Park and Gardens.
- 7.4.11 Aerial photographs and panoramic 'birds eye' views over the 3 DAs are included within Figures 7.11 to 7.13 presented in **Appendix 7.3** (Doc Ref 4.01.7c). These illustrate the local landscape context.

#### Development Area 1 (DA 1) Pancross

- 7.4.12 DA1 'Pancross' is in the ownership of Pancross Farm (the main farm buildings for which are located to the south of the settlement of Llancarfan). It is situated within LCA 16 'Central Slopes and Valleys' and visual sensory area VS146 'Central Vale Ridges and Slopes.' It is comprised of 3 large fields, two elongated linear enclosures and a third medium sized rectilinear enclosure which are all laid out for arable use currently cropped for silage purposes. The main body of this DA has a relatively open aspect facing north and due to the historic removal of interior hedgerows (Post 1970 OS series) a fairly featureless interior with no buildings within it.
- 7.4.13 The fields are set within rolling lowland of the wider character area which may be described as a plateau which is then dissected by the Nant Llancarfan Valley to the immediate west and south west. In general, this plateau affords distant views to the Bristol Channel but not at a local level, here it is more rolling and afforded a greater level of localised enclosure from the nearby valley sides slopes of the Nant and Waycock river valleys with the landform narrowing as it tapers in a general south-westerly direction. As a result, the majority of the immediate local area is south facing and land falls away from east to west along these general local drainage lines from a high point of around 93m AOD in the north east corner of the site adjacent to the A4226 which cuts between the opposing Waycock valley and also between DA's 1 and 2.
- 7.4.14 Within DA 1 land continues to fall away gently westwards across the 2 large linear fields before falling more steeply towards the western edge to a low point of around 46m AOD in the south west corner adjacent to the unnamed road between the two neighbouring farmsteads Ty' n y coed and Whitewell. The topography of the site is then more varied as a result of a gentle central ridge which broadly divides it east to west with terrain then undulating between the north and south hedgerows boundaries. When combined with the rolling surroundings this is often sufficient enough to screen parts of the site particularly the narrower southern field which is located in a localised dip but also screening distant views through the site. The main north facing field falls with the general east to west slope (between 73m AOD from the edge of Coed yr Aber at the north east corner to 57m AOD, where it joins the woodland enclosing the neighbouring farm Ty' n y-coed at the northwest corner.
- 7.4.15 DA 1 is characterised by a large scale overhead electricity transmission line and associated pylons that cross on an east west alignment through the northern areas of DA before passing into adjoining fields close to the north western boundary.



Established landscape features with DA 1 are limited it is subdivided by an interior hedgerow (and access track) which links the east and west sides of the site and connects into an agricultural slurry pit that will remain. One hedge row also passes through the centre of the site on a north west to south east alignment, close to the slurry pit. A further smaller scale Overhead Line (OHL) corridor cuts diagonally across the western enclosure in a north westerly direction.

#### Development Area 2 (DA 2) Redlands

- 7.4.16 DA 2 'Redlands' is located to the immediate east of the A226 which cuts between DA 1 and DA 2, following a localised intermediate valley which often visually separates the two general halves of the site with DA 1 and 3 to the west and DA 2 to the east of this line. The small to medium sized fields are laid out to pasture and are currently grazed. The proposed solar deployment area encompasses sloping land of the gentle side slopes of the Waycock Valley with land falling away south (as is typical of the character area) but also west to east away from DA's 1 and 3 which visually separates it from these areas. The east side of the site is located within the neighbouring LCA 22 Dyffryn Area (Visual Sensory Area Upper Waycock Valley/Dyffryn VS608) with the small to medium scale hedge lined field enclosures much more typical of the higher value character described for this LCA rather than the neighbouring LCA 16 (moderate value) to the west. Despite the presence of the large scale overhead transmission lines and pylon corridor crossing the site, the character is generally of a higher scenic value to that of DA 1 with the hedge lined pastures and views to woodland on the Waycock valley sides bounding the site providing a more pleasing overall composition which helps to assimilate the power line so that it is less discernible compared with views over the more open land at Pancross (DA 1). The field pattern is fairly intact (mainly formed by historic hedge trees, ground level hedges are limited) but remains consistent with the prevailing enclosed valley pasture character found in the Dyffryn area to the immediate east of the site.
- 7.4.17 The landform of the site is gently sloping, falling from 88m AOD at the western boundary with the A4226 to a low point of 61m AOD at the eastern boundary. The site also then slopes from a high point of 95m AOD adjacent to Coed y Cwm at the northeast corner to 61m AOD at the southern end of the site at Brook Wood. Coed y Cwm (wood) encloses DA 2 from the north and provides a high degree of screening in views from St Nicholas and the A48 corridor to the north /north east as well as partial screening of views from the south east to the north of Dyffryn. Betty Lucas Wood and Brook Wood located on river terraces either side of the River Waycock form an effective screen to views from the south where together with mature hedgerows they form the densely vegetated southern boundary. The wooded course of the river follows the southern site boundary meandering between opposing woodland blocks before heading westwards past the visually enclosed Dyffryn House and Gardens (RPG).
- 7.4.18 The sites interior is bound by remnant hedgerows in various states of condition, some of which contain mature hedgerow trees which when combined with intermittent field trees within the interior help to filter views across the site and from surrounding visual receptors. The sites field pattern is relatively intact when compared against historic periods of enclosure but with the loss of some short sections of hedgerow.
- 7.4.19 The farm buildings at Redlands Farm are located to the immediate northwest of DA 2

adjacent to the A4226. Moving north from the farmstead visibility towards the site is then screened by the intervening valley topography and roadside vegetation.

#### Development Area 3 (DA 3) Oaklands

- 7.4.20 DA 3 'Oaklands' is located to the immediate south of DA 1 Pancross and west of DA2 and is accessed via a surfaced track from the A4226. It is located within the same character area as DA 1 Pancross (LCA 16 Central Slopes and Valleys/VS146) but shares more characteristics of the adjoining LCA 17: Llancarfan and Waycock Valleys due to its similar sloping topography, intimate enclosed field structure and wooded valley fringe setting. LANDMAP describes the adjoining character of VS 453 to the south and west as a 'steep sided narrow and enclosed lowland valley, which contains a tranquil landscape of streams, woodlands and small farms' which better describes the general character within the smaller scale DA at Oaklands, the character of which is more diverse than the open and more exposed lowland plateau below within VS 146.
- 7.4.21 The site sits above Pancross on gently sloping land at the top of north facing valley side slopes between the Nant Llancarfan and Nant Whitton River valleys with a high point of 87m AOD at its southern boundary comprised of a woodland edge. The woodland bounding the site to its south and western edges (Coed Quinnet /Coed Whitton) occupies the ridge between the two valleys with land sloping down from the edge of the site to the Nant Whitton at c.68m AOD which heads west to meet the Nant Llancarfan in the adjoining valley. The woodland enclosing the site follows the south-westerly alignment of the Nant Whitton with land rising subtly either side within the wooded small river valley set below the site. Moving further south land then falls away again over gently rolling topography so that from this aspect the site is well hidden from the neighbouring valley.
- 7.4.22 The site is comprised of small scale field enclosures laid out to a mixture of mixed grassland pasture, with a high proportion of wildflower species bound by hedgerows and mature tree banks. The layout is well intact with limited changes from historic periods of enclosure. The site is currently part grazed and part managed for hay production with a small immature orchard area recently planted.
- 7.4.23 Aerial photographs and panoramic 'birds eye' views over the 3 DAs are included within Figures 7.11 to 7.13 presented in **Appendix 7.3** (Doc Ref. 4.01.7c). These illustrate the local landscape context.

#### Landscape Value

- 7.4.24 Paragraph 5.19 of GLVIA3 identifies that following a review of existing landscape designations, "the value attached to undesignated landscapes also needs to be carefully considered and individual elements of the landscape – such as trees, buildings or hedgerows – may also have value." This LVIA provides a review of undesignated landscapes and landscape elements, which includes (but is not limited to) field structure, hedgerows, woodland, watercourses and trees, and attributes a value to these elements.
- 7.4.25 GLVIA3 recommends that when undertaking a LVIA/LVA in an undesignated area, landscape value should be determined through a review of existing assessments, policies, strategies and guidelines and, where appropriate, by new survey and analysis (paragraphs 5.27 and 5.28).

- 7.4.26 The guidance states that the value of a landscape should be assessed as one of two components of landscape sensitivity. Landscape value is the 'inherent' component, which is independent of the development proposal, while the other component, susceptibility, is development specific.
- 7.4.27 The value of the landscape potentially affected by a proposed development is evaluated when establishing the landscape baseline and is judged as being High, Moderate or Low. This is in accordance with paragraph 5.44 of GLVIA3. Landscape value is also referred to in the following section as part of the method for 'Assessing the Level of Landscape Effects'.
- 7.4.28 The landscape value of the site and the immediate adjoining area is considered with reference to the indications of Landscape Value as identified in Table 1.2 of the Methodology (Appendix 7.1). The following table 7.3 provides an analysis of each of the indicators and classifies the landscape value in accordance with the Methodology.
- 7.4.29 The landscape value descriptions and criteria are considered for all of the DAs (1, 2 and 3) combined, but where there are specific differences, it is noted. Area 1 is comprised of 2 larger scale elongated fields currently in arable use whereas DA's 2 and 3 are smaller scale, hedge lined enclosures bordered by woodland blocks providing a higher degree of enclosure.
- 7.4.30 The landscape value is considered at two levels; **district level** (in this case the study area and at the **site level** and the immediate adjoining area only).
- 7.4.31 Landscape value is considered with reference to the indications of Landscape Value as identified in **Table 1.2** of the Methodology (**Appendix 7.1**, Doc Ref 4.01.7a). The following table provides an analysis of each of the indications and classifies the landscape value in accordance with the Methodology

**Table 7.2: Landscape Value Classification**

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
<p><b>Natural Heritage</b> (Site and Immediate Context)</p>	<p>Solar Development Area set within a range of field sizes, medium to large for DA 1 and small to medium for DA's 2 and 3.</p> <p>The 3 sites are all working farms.</p> <p>DA 1 Pancross is laid out to arable comprised of 2 elongated fields and 1 medium scale field. The site is overall of limited habitat value with its primary function arable grassland cropping. It does have mature hedgerow boundaries (north and south) and 2 adjoining woodland blocks which provide enclosure to some aspects (southeast/northeast) and valuable wildlife habitat that contributes to local landscape pattern and structure. Otherwise, the site itself has an open and featureless interior which does not contribute to the prevailing smaller scale and geometric surrounding hedge lined fields.</p> <p>Conversely DA's 2 and 3 are smaller scale hedge lined field enclosures that provide a more positive contribution in terms of</p>	<p><i>The sites are within 2 adjoining Special Landscape Areas (SLA) with the covering a large geographic area in common with much of the countryside across the Vale of Glamorgan.</i></p> <p><i>Overall, the site is of a medium importance and rarity at a regional and local scale lying wholly within a district designated landscape. Local character of the site is commonplace across the region and locality.</i></p> <p><i>LANDMAP assessed the aspect areas which the site is a part of as being moderate in terms of visual sensory and landscape habitat aspects. The surrounding landscape inclusive of Llancarfan (VS453) to the south west and Upper Waycock Valley and Dyffryn (VS608) to the east and St Nicholas Ridge (VS271) to the north are all of higher value and provide the more valuable surrounding context to the immediate setting. This is recognised by the entire area being covered by the SLA designations.</i></p>	<p>Medium</p>

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	prevailing character, sense of place and habitat connectivity.		
<b>Natural Heritage</b> (Study Area)	<p>LANDMAP has assessed the majority of landscape habitat areas found outside of the sites immediate context to be of High value which includes Llancarfan (VS453) to the south west and Upper Waycock Valley and Dyffryn (VS608) to the east and St Nicholas Ridge (VS271) to the north.</p> <p>The surrounding landscapes are generally much more varied and complex in terms of scale, topographic variation and features. Landscape pattern is generally one of well-defined small scale fields within a rolling landscape and also contains narrow wood lined valleys with areas of semi natural woodland such as Aberthaw River Valley. The parkland pastures surrounding Dyffryn Gardens are another area of high value landscape of contrasting intimate character with greater definition from woodland blocks</p>	<p><i>Presents locally important landscape characteristics or scenic value;</i></p> <p><i>Presents important public amenity value by way of views, access, biodiversity, cultural or opportunity for quiet enjoyment (relative tranquillity).</i></p> <p><i>Important to the setting of historic park and garden</i></p>	High

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	and hedge lines smaller scale fields. Nant Llancarfan SLA and historic landscape area around Llancarfan to the west and south west side of study area.		
<p><b>Cultural Heritage</b> (Site and Immediate Context)</p>	<p>Part of DA 1 is within an Historic Landscape Area (Llancarfan) although the area within DA 1 is distinct and separate from the settlement and secluded valley of Llancarfan and so does not share the same intimate landscape character comprised of enclosed valley side pastures.</p> <p>DA 2 is close to the Dyffryn area which contains important historic monuments, but these are located outside of the site around Tinkinswood &gt;500m and so the site makes a more limited contribution to the overall cultural value of the wider area which LANDMAP assesses as being 'Outstanding'.</p> <p>There has been some degradation of character, DA 1 in particular has amalgamated into large fields and lost its internal historic</p>	<p>The site and immediate vicinity is of '<i>Medium importance and rarity at local scale</i>' with few <i>cultural heritage features found save for some local farmhouses which are listed as National Monuments.</i></p>	<p>Medium</p>

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	<p>small scale field pattern, which is characteristic of the wider Historic Landscape Area.</p> <p>The site is not publicly accessible and so does provide opportunity to appreciate the wider setting and cultural aspects of the local landscape.</p>		
<p><b>Cultural Heritage</b> (Study Area)</p>	<p>The surrounding area is classed as Outstanding in terms of historic landscape, covering all of the DA's and surrounding area. The majority of elements and features which go towards this high cultural value are located outside of the site area.</p> <p>The study area includes the following important landscape areas: Llancarfan historic landscape area which is 75% high or outstanding due to its unique secluded valley and ancient settlement with irregular fieldscape, small, nucleated villages with well-preserved landscape features evidencing its historic development with a strong sense of pace and time depth.</p>	<p><i>Presents locally important landscape characteristics or scenic value;</i></p> <p><i>Presents important public amenity value by way of views, access, biodiversity, cultural or opportunity for quiet enjoyment (relative tranquillity).</i></p> <p><i>Important to the setting of historic park and gardens in the study area and HLA.</i></p>	<p><b>Very High</b></p>

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	<p>Likewise Dyffryn to the east is a characterful undulating landscape with wooded streams and a regular intact small scale fieldscape. It also contains several neolithic monuments of national importance (SAM's). The area to the south east is the setting for Dyffryn Gardens (RPG) an outstanding example of an Edwardian garden with an important woodland 'essential' setting surrounding the grounds.</p> <p>Overall, the surrounding landscape structure is more varied and contains a much higher proportion of important cultural features. It includes areas of mosaic and valley landscape that are significant examples which are irreplaceable. It is also more publicly accessible than the site (which has no PROW) which provides more opportunities to appreciate and enjoy it.</p>		
Landscape Condition	The DA's are in a varied condition. With reference to 1888-1913 historic maps DA's 2 and 3 are more intact retaining their historic smaller scale more intimate structure with most hedgerows remaining. DA 1 is more	<i>Areas identified as having some redeeming feature(s) and possibly identified for improvement. Presents some locally distinctive landscape characteristics such as woodland and single mature trees bounding the site with some</i>	Medium



Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
<p>(Site and Immediate Context)</p>	<p>open and has amalgamated into large fields for arable production but in general is in reasonable condition, typical of improved grassland in arable use. Woodland areas are also little changed with the level of coverage largely as it was (ref: 1888-1913 OS).</p> <p>LANDMAP visual sensory comments relevant to the site (Central Vale ridges and Slopes): <i>'The landcover is dominated by a medium to large field pattern, mainly pasture set in managed hedgerows. The area is mainly open but there are some clumps of woodland both coniferous and deciduous. These are concentrated towards the west and north east, generally situated on hill tops or steeper slopes where they can be seen from long distances. Settlements consist of farms and hamlets scattered evenly throughout the area. Several minor roads cross the area and the A4226 (which bisects the DAs) runs close to the eastern boundary affecting tranquillity in this vicinity.'</i></p>	<p><i>scenic interest that would have limited potential for substitution but is nevertheless commonplace in the locality.</i></p>	

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	<p><i>Value: <b>Moderate.</b> 'Plateaux with scattered rural farms (mosaic field pattern with managed hedgerows'.</i></p> <p>The sites has few detracting elements save for the overhead transmission corridor with pylons vertical detractors in an otherwise relatively unspoilt landscape structure although some change of pattern as a result of changing farming practices (high intensity arable farming DA 1).</p> <p>Field boundaries are in varied condition with retained mature hedgerows to the outer boundaries but with some loss and removal internally. Woodland blocks likely require further management (subject to further survey) but overall appear to retain their high semi natural habitat value and provide good enclosure from some of the more sensitive higher value landscapes surrounding the site DA's.</p>		

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
<p><b>Landscape Condition</b> (Study Area)</p>	<p>The study areas surrounding rolling lowland and lowland valleys landscapes appear relatively intact. The A48 corridor has seen the greatest level of change due to development pressure with ribbon development effecting local character and the setting of historic village settlements along the route.</p> <p>Tranquillity of this road corridor and that of the A4226 bisecting the DA's is affected. LANDMAP comments on the ridge landscape and A48 corridor: '<i>Generally the rural landscape appears well managed over large parts of the area. However, suburban detailing and development along the A48 and nearby settlements is modifying the rural landscape</i> '</p> <p>Generally, strong landscape structure has been retained with woodland blocks little changed in the last century since early OS records. Parkland landscape around Dyffryn well retained as is valley pastures around Llancarfan. Hedgerows in varied condition with a few removals, but majority are retained and still provide an intact structure (strong time</p>	<p><i>Medium importance and rarity with limited potential for substitution at regional and local scale. Locally designated (SLA's) covering the entire study area.</i></p> <p><i>Provides locally important landscape characteristics</i></p> <p><i>Presents important public amenity value by way of views, access, biodiversity, cultural or opportunity for quiet enjoyment (relative tranquillity).</i></p>	<p>Medium-High</p>

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	depth). Main detractors lie within main A48 development corridor		
<b>Associations</b> (Site and Immediate Context)	<p>The site borders a wider area of historic landscape although itself is not known to be linked to specific people or events.</p> <p>The site is not known to be associated with any historical events or people that contribute to perceptions of natural beauty of the local area and site.</p>	Does not present locally important / distinctive landscape characteristics and distinctions	Low
<b>Associations</b> (Study Area)	<p>The study area contains the ancient settlement of Llancarfan, an historically important Early Christian monastic centre associated with the famous 6th century Welsh saint St Cadog, a contemporary of St David.</p> <p>Dyffryn also contains significant neolithic burial chambers Neolithic megalithic monuments are</p>	<p><i>'Presents important amenity value by way of views, access and opportunity for quiet enjoyment .'</i></p> <p>Important to the setting of a registered historic park and garden.</p>	High

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	<p>distributed across this area and fall into the Cotswold Severn group of chambered tombs.</p> <p>The area to the east provides the site and setting of Dyffryn house and gardens and has an intact historic field structure.</p>		
<p><b>Distinctiveness</b> (Site and Immediate Context)</p>	<p>The DA's do not have any features that aren't commonplace in the local area. DA 1 is unremarkable arable grassland bordered by native hedgerows. DA's 2 and 3 are small scale hedge lined pastures surrounded by woodland blocks which are more distinctive but are also typical of the locality and region.</p>	<p><i>Low importance and rarity at a local scale. Presents some locally distinctive characteristics with some scenic interest.</i></p>	<p>Low-Medium</p>
<p><b>Distinctiveness</b> (Study Area)</p>	<p>The surrounding study area does present areas with more distinct characteristic features such as the semi natural woodland found on valley slopes (Llancarfan HLA) around Llancarfan. There is also the mosaic of pastoral fields and arable enclosures around Dyffryn referencing historic periods of enclosure that provide a good time depth and coherent field pattern that is in an unspoilt</p>	<p><i>Medium importance and rarity with limited potential for substitution. Presents some locally distinctive characteristics with some scenic interest.</i></p>	<p>Medium</p>

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	<p>condition. Overall, the surrounding area does have a strong sense of identity, but most features are still relatively commonplace regionally with other examples of similar character regularly found.</p>		
<p><b>Recreational Value</b> (Site and Immediate Context)</p>	<p>The Development Areas do not have any valued recreational features within the boundaries and are not publicly accessible with the immediate setting largely private farmland.</p>	<p><i>Low importance and rarity at local scale. The site does not present important public amenity value by way of views, quiet enjoyment and access. The immediate setting presents some amenity value by way of views, access, biodiversity, cultural or opportunity for quiet enjoyment (tranquillity).</i></p>	<p>Low</p>
<p><b>Recreational Value</b> (Study Area)</p>	<p>The wider study area has a more extensive range of local footpaths which link the village settlements. It also contains visitor destinations including Dyffryn Gardens and the historic settlement of Llancarfan. The area is noted for its high scenic value (LANDMAP) with local footpath routes providing access to more tranquil areas with opportunities for quiet enjoyment.</p>	<p><i>Presents Locally important amenity value by way of views, access and opportunity for quiet enjoyment. Conversely large areas of inaccessible pastoral farmland and woodland reduce the overall amenity in terms of public access and wider recreational opportunities.</i></p>	<p>Medium-High</p>

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
<p>Perceptual (Scenic) (Site and Immediate Context)</p>	<p>The Development Areas are all within areas of Special Landscape Area covering much of the study area and wider region so are of value as they contribute to some attractive local views. LANDMAP scores for most of the DA's are 'Moderate' for visual sensory landscape aspects as character is commonplace and landscapes are often working farm landscapes. The presence of roads - A4226 /A48, electricity pylon corridor and removal of hedges in DA 1 also impacts upon scenic value. The sites are close to areas of higher value such as that around Llancarfan to the south west and Dyffryn to the east which covers the east side of DA 2 as it contains similar smaller scale pastures.</p>	<p><i>Presents some public amenity by way of views, access, and opportunity for quiet enjoyment. Presents some locally important landscape characteristics</i></p> <p><i>Presents some locally important landscape characteristics such as small scale historic enclosures (pastures).</i></p>	<p><b>Medium</b></p>

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
<p>Perceptual (Scenic) (Study Area)</p>	<p>The surrounding landscape is generally of higher scenic value to that of the DA's as it is more unspoilt and exhibits more intact and distinct landscape features. These areas include the narrow sloping wooded valley sides around Llancarfan to the south west, the hedge lined/wooded pastures around Dyffryn to the east and the characterful ridge above St Nicholas and Bonvilston which provides long distance views over the Vale of Glamorgan and to the coast. This is in contrast to DA 1 which is within an undulating more open area of landscape with less woodland defining it compared to its surroundings.</p> <p>In general, the wider landscape is also more accessible; so that attractive views are able to be appreciated and quiet enjoyment of the landscape is available.</p>	<p><i>Presents locally important landscape characteristics or scenic value.</i></p> <p><i>Presents public amenity by way of views, access, and opportunity for quiet enjoyment.</i></p>	<p><b>High</b></p>
<p>Perceptual Aspects</p>	<p>The site and immediate context are away from large areas of settlement and the countryside</p>	<p>Whilst the DA's are relatively tranquil as they located away from settlement edges and are in a</p>	<p><b>Low-Medium</b></p>



Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
<p>(wildness and tranquillity) (Site and Immediate Context)</p>	<p>in this part of the Vale does feel relatively tranquil with quiet dispersed village settlements.</p> <p>The A4226 (which bisects the DAs) affects tranquillity in the vicinity of the site. The ribbon development and traffic on the A48 to the immediate north also similarly has an urbanising effect which reduces the sense of wildness and tranquillity around the site's immediate context.</p>	<p>generally fairly quiet part of the Vale but '<i>Present few opportunities for quiet enjoyment</i>' given the lack of public access and the fact it is a working farming landscape.</p>	
<p>Perceptual Aspects (wildness and tranquillity) (Study Area)</p>	<p>The surrounding areas contains areas of semi natural woodland providing localised enclosure and more tranquil areas than that of the DA's. Tranquillity also affected by A4226 (north/south) and A48 which cuts east to west across the study area. There are however a number of local footpaths which can offer access to more tranquil areas such as the narrow and more enclosed valley slopes around Llancafarn or the small scale pastures to the east around Dyffryn. In general, the sense of wildness is more limited by the</p>	<p>The Study area has wide areas of designated landscape (SLA) and presents more '<i>amenity value by way of views, access, biodiversity, cultural or opportunity for quiet enjoyment (tranquillity)</i>'. But is also affected by road corridors and other urbanising features such as pylon corridors and working farmland that is not always as comparatively tranquil as other areas.</p>	<p><b>Medium</b></p>

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	presence of urbanising elements such as pylon corridors and farming activities.		
Function (Site and Immediate Context)	The Development Areas are all functionally limited given the majority of the landholding is laid out to arable and pasture and there is no public access. DA's 2 and 3 are slightly more functionally varied providing connectivity with woodland around the site and hedgerows contributing to character and surrounding field pattern; conversely DA 1 is more open and featureless but nevertheless is still of local value in terms of being a component part of some attractive scenic views.	Provides Landscape that <i>'contributes to the healthy functioning of the landscape, e.g. hydrological systems...woodland...physical link with an adjacent landscape designation (SLA). Is a functional part of wider ecological network Overall functional value limited in terms of being a Green Space asset</i>	<b>Low-Medium</b>
Function (Study Area)	The study area as a whole is more functionally diverse than the Development Areas particularly in comparison to DA 1 which is monofunctional arable grassland but all DA's are private farmland which limits their functional landscape roles. DA's 2 and 3 are more diverse in habitat terms with their small	<i>Medium importance and rarity, limited potential for substitution. Regional and local scale. SLA designation across the whole study area. Important setting of an historic park and garden (Dyffryn)</i>	<b>Medium-High</b>

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	<p>to medium scale hedge lined field enclosures providing a visual and landscape scale link with surrounding woodland blocks whereas the open aspect of DA 1 feels more of a break in character and isn't typical of adjoining LCA/VS areas which exhibit more intimate character and are of a high scenic value to which DA 2 and 3 are more closely associated.</p> <p>The surrounding study area has much higher levels of public access from which to appreciate the local scenery. To the immediate north it is more settled containing the villages of Bonvilston and St Nicholas and recreational opportunities such as golf courses in the busier A48 corridor which does though reduce tranquillity slightly.</p> <p>The elevated ridge crest above (St Nicholas and Bonvilston Ridge Crest) provides longer range views towards Bristol Channel and Somerset.</p> <p>The surroundings to the west in the Llancafarn valley (historic landscape area/SLA are of</p>	<p><i>Presents important public amenity by way of views, access, biodiversity and opportunity for quiet enjoyment.</i></p> <p><i>Presents locally important landscape characteristics and has high scenic value</i></p>	

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
	<p>historic and cultural importance with evidence of historic fortifications on the plateau edge. These features raise its functional value and an extensive path network within the narrow valley offers many opportunities for quiet enjoyment. The settlement of Llancafarn (Conservation Area) is also an important visitor destination.</p> <p>To the east, the Dyffyn area is a diverse mosaic of small scale pastoral fields with good time depth and intact landscape referencing historic periods of enclosure. It is also culturally important with many scheduled monuments including neolithic burial chambers. The area is also the setting for Dyffryn gardens a nationally important (RPG) example of Edwardian architecture and gardens run by the National Trust making it a regional visitor destination. The area is also afforded footpath connections to St Nicholas and onwards connections further west to Wenvoe.</p>		

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
<p><b>Landscape Value of the Site (DA 1,2 and 3) and immediate adjoining areas Summary</b></p>	<p>Overall, through the consideration of the indicators of landscape value, the site itself is concluded to be of a <b>Medium</b> importance and rarity at a local scale. The DA's are broadly covered by 'Moderate' Visual sensory scores and the character generally follows that as described in the Aspect Area assessments. The site, like the study area are all within Special Landscape Areas and some of DA 1 is within Llancarfan registered historic landscape although large areas of DA 1 and 3 are also within the Local Area of Search for Solar.</p> <p>The site's value is influenced by its location away from settlements but with some influence still felt from the nearby road corridors, particularly the A 4226, which pass between the east and west halves of the proposed deployment areas.</p> <p>There is no current public access to the 3 DA's and this will remain.</p> <p>The wildlife habitat value of the DA's is an important consideration although the arable and pasture land is not overly distinctive and is found widely across the local area and the scheme has been designed to avoid ecological sensitive areas at a site level.</p> <p>The landscape structure of the DA's is relatively intact more so in DA's 2 and 3 with hedgerows boundaries little changed whereas DA 1 has had several removed to facilitate arable grassland although its outer boundaries are mature and still provide valuable landscape structure and wildlife habitat.</p> <p>The DA's are all have components of some attractive local views, although views further afield are less available than from the surrounding study area which has more accessible vantage points on local ridgelines. The visual setting is negatively affected by some localised detractors (electricity pylons, road corridor (A4226) and ribbon development along the A48.</p>		<p><b>Medium</b></p>

Landscape Indications / Value Considerations	Description	Value Method Criteria	Value Assessment
<p><b>Landscape Value of the Study Area Summary</b></p>	<p>The study area outside of the DA's is predominantly within areas of higher scenic value as recognised by LANDMAP. LANDMAP has assessed the majority of landscape Aspect Areas found outside of the site's immediate context to be of High value which includes Llancarfan (VS453) to the south west, Upper Waycock Valley and Dyffryn (VS608) to the east and St Nicholas Ridge (VS271) to the north.</p> <p>In general, these local landscapes are much more varied in terms of landscape features and characteristics and provide a more enclosed, intact and intimate landscape in terms of scale and structure.</p> <p>The surrounding area contains many more culturally and historically significant (listed and registered features) as well as important visitor destinations including the outstanding examples of Dyffryn House and Gardens and Llancarfan which are both recognised although regional level designations.</p> <p>Levels of wildness and tranquillity are broadly similar to that of the DA's with the same influences present although the more enclosed nature of some areas (narrow wooded valleys and enclosed valley side and mosaic of small scale pastures means they are often less perceptible and visual detractors such as the pylons and road corridors are able to be visually assimilated by the wider landscape structure.</p> <p>There is also much more public access available via a well-connected local footpath network so that opportunities for recreation and quiet enjoyment of the landscape are widely available.</p>		<p><b>High</b></p>

## Landscape Receptors

### Landscape Designations

- 7.4.1 Landscape designations within the study area (applicable to this LVIA) are illustrated on Drawing SRE1113 09 20 and SRE1113 09 25 presented in Appendix 7. Relevant designations mapped at this stage include: Registered Parks and Gardens (RPG); Country Parks (CP); and, landscape designations within the Local Plan/Development Framework (if still applicable) such as: Special Landscape Areas (SLA) and any national landscape designations; Areas of Outstanding Natural Beauty (AONB); and, National Parks (NP).

### Special Landscape Areas

- 7.4.2 The study area is covered over by 4 separate Special Landscape Areas (SLA's) the edges of which meet at Bonvilston to the north of the site. The most significant parts of the study area are within **SLA 4: Nant Llancarfan** to the south western quadrant of the study area which includes DA 1 Pancross and DA 3 Oaklands. The SLA boundary is centred on the 5 Mile Lane, A4226, so not a landscape feature. To the east, the **SLA5: Dyffryn Basin and Ridge Slopes** is found which covers of DA 2, Redlands site area.
- 7.4.3 The other SLAs in the north of the study area include SLA 2, Lower and Upper Thaw Valley, north of the site and Bonvilston, and SLA 3, Ely Valley and Ridge Slopes covering the north east of the study area to the north of St Nicholas and the A48. Both these SLAs are considered to be of less relevance to the assessment given that they are well separated from the site and outside of the area of theoretical visibility (Refer to Drawing SRE 1113 09 24).
- 7.4.4 The Vale of Glamorgan County Borough Council produced a report on the designation of Special Landscape Areas in 2008. It states the following with regard to SLA 4 Nant Llancarfan:

*“Aspect area identified High and Outstanding evaluations associated with the Nant Llancarfan Valley. The narrow and enclosed Waycock Valley, with many villages designated as Conservation Areas, occupies the southern region of this SLA. The eastern boundary along the A4226 abuts the Dyffryn Basin and Ridge Slopes SLA.”*

- 7.4.5 Key characteristics of Nant Llancarfan SLA of relevance to the site and study area are as follows:

*“The majority of the area is rolling lowland, dissected by the Nant Llancarfan valley. This central area is highly enclosed by the adjacent plateau landscape. It is a steep sided, narrow lowland valley, which contains a tranquil and historic landscape of streams, semi-natural broadleaf woodlands, planted coniferous woodland and small farms. It has a strong, small scale, pastoral pattern and traditional settlement form including villages with Conservation Area designation. It is of high scenic quality with a strong sense of place. There is a diverse range of habitats of local and international importance, including lagoons of international value, 4 BAPs and Nant Whitton Woodlands SSSI. Agricultural improvement (grazing, drainage and chemicals) threatens neutral grasslands and rush*

*pastures have suffered substantial and rapid decline. The ancient settlement of Llanccarfan village stands within a Registered Landscape of Outstanding Historic Interest and contains a Conservation Area. It is evaluated as Outstanding as one of the best surviving and most complete typical parts of the Vale of Glamorgan with the setting of the large church within the nucleated village.*

*A tranquil atmosphere prevails despite the main roads. The scattered rural/farm landscape is of outstanding value as being picturesque, for the preservation of historic communities and the richness of historic past. To the north the prominent ridge crest features, along with the A48 and associated linear development.”*

7.4.6 Key policy and management issues for SLA 4, Nant Llanccarfan of relevance to the site and the development proposals are as follows:

- *‘Retain and enhance intrinsic character through woodland and Hedgerow management and development restriction.*
- *Maintain tree cover on ridgeline to the north to integrate development.*
- *Improve hedgerow cover and woodland blocks.’*

7.4.7 With regard to SLA 5 Dyffryn Basin and Ridge Slopes the VLG CBC states:

Key characteristics of Dyffryn Basin and Ridge Slopes SLA of relevance to the site and study area are as follows :

*“The majority of the area is an attractive, gentle valley of the Nant Bran and River Waycock. There are broad, pleasing views to well-managed countryside which retains a coherent large field pattern and woodlands. It is a relatively unspoiled historic rural landscape and the area includes several BAPs. Settlements are well integrated with the landscape and surrounding vegetation. The combination of road, stream/drainage ditch, stone wall/garden or dwelling is typical and representative of the Vale in this area. This combination has kept a high integrity and is well managed, hence rare.*

*Dyffryn Gardens, at the centre of the SLA, is discretely enclosed by woodlands. It is an exceptional example of a planned landscape by Thomas Mawson and Grade 1 on the Register of Landscapes, Parks and Gardens of Special Historic Interest in Wales and is open to the public...”*

7.4.8 Key policy and management issues for SLA 5 Dyffryn Basin and Ridge Slopes of relevance to the site and the development proposals are as follows:

- *Reinforce rural character and minimise the impact of new development, restricting development on slopes in particular.*
- *Develop woodland cover and hedgerows to better integrate settlement.*
- *Improve the road corridor and associated development, including detailing.*
- *Pursue favourable management of neutral grassland close to conurbation and manage scrub on grassland.*

#### Llanccarfan Historic Landscape Area

7.4.1 The Registered Historic Landscape of Llanccarfan (HLW (SG) 1) is partially located within the western extent of DA 1 of the proposed development site. This landscape is separated into twelve Historic Landscape Characterisation Areas (HLCAs), and the site is located within HLCA 010 Bonvilston Amalgamated Fieldscape.



- 7.4.2 The Glamorgan-Gwent Archaeological Trust provide the following description of Llanccarfan Historic Landscape:

*The ancient settlement and secluded valley of Llanccarfan, situated in the central plateau of the vale, is one of the best surviving and most complete, typical example of the historic landscape of the Vale of Glamorgan as a whole. The setting of the large church within its picturesque, nucleated village is typical of the strong, monastic and Anglo-Norman influences in the vale, as demonstrated elsewhere such as Llandough, Llantwit Major and Merthyr Mawr. The focal setting of the ancient church at Llanccarfan, itself testimony to early Welsh Christianity, can also be regarded as typical of the regional settlement pattern as a whole.*

#### Registered Parks and Gardens

##### *Dyffryn (Grade I)*

- 7.4.1 Dyffryn Gardens is c.700m south-east of DA 2. The RPG are registered at grade I 'as the grandest and most outstanding Edwardian gardens in Wales. They are comparable to some of the most extravagant gardens of the period in Britain. They are the result of a remarkable partnership between the owner and horticulturalist Reginald Cory (1871-1934) and the landscape architect Thomas Mawson (1861-1933). The structure of the gardens, combining the expansively formal and the intricately intimate, survives almost in its entirety, with some later modifications within the general framework. The registered park and garden shares important group value with the house, built in 1891-3 for well-known industrialist and philanthropist John Cory, and its associated estate buildings and garden features'. Significant View: From the south front of the house - the garden is aligned to the house by a strong central north-south axis dominated by the canal.
- 7.4.2 Effects upon the setting of the RPG and views from It will be considered in the assessment section.

##### *Llantrithyd Place (Grade II\*)*

- 7.4.3 Llantrithyd Place is located c.1.1 km north west of DA 1. The RPG is 'registered for the remarkable survival, unaltered, of the structure of an important sixteenth-century garden and of a mid-seventeenth century deer park. The garden is of some complexity, with terraces, ponds and walks, including an unusually sophisticated raised walk up to a look-out mount, or gazebo. The walled deer park is exceptionally complete. The registered area lies on two sites, separated by a distance of about 1km: the deer-park to the north, and the garden to the south'. Significant views - The location of the park lodge on high ground would have afforded panoramic views of the surrounding countryside. The look-out mount, or gazebo, in the garden would have offered fine views across the countryside to the south-east, possibly as far as the Bristol Channel beyond.
- 7.4.4 Effects upon the setting of the RPG and views from It will be considered in the assessment section.

##### *Coedarhydyglyn (Grade II\*)*

- 7.4.5 Coedarhydyglyn is located c.1.85 km to the north east of DA 2. The site is 'registered for its historic interest as a good example of an early nineteenth century landscape

park surviving in its entirety and forming an attractive setting to the house. Edwardian development of the gardens included a woodland Dell with Japanese features, possibly designed by Alfred Parsons and partners. The registered park and garden has group value with the house and contemporary estate buildings, including the coach-house and stables'. Significant Views: Coedarhydyglyn is situated on a west-facing slope, overlooking a secluded valley which forms part of its park.

7.4.6 Effects upon the setting of the RPG and views from It will be considered in the assessment section.

## 7.5 PROPOSED DEVELOPMENT

7.5.1 The proposal relates to the construction, operation, maintenance and decommissioning of a ground mounted Solar Farm and Battery Energy Storage System (BESS) plus ancillary infrastructure including the following:

- Photovoltaic (PV) panels to a maximum height of circa 3m;
- Mounting frames - matt finished small section metal structure;
- BESS compound; containing c. 20 battery storage units set in bays of two surrounded by 3m high concrete firewalls, associated infrastructure, car parking and surrounded by c. 4m high acoustic fence
- Scheme of landscaping and biodiversity enhancement;
- Central Inverters (inverters and transformers will be housed together in prefabricated containers to a maximum height of circa 3m), substations (DNO and Customer to a maximum height of circa 3m) and associated cabling (below ground);
- Point of connection;
- Stock fencing up to a height of circa 2m to secure the development areas;
- Infra-red CCTV (CCTV cameras would operate using motion sensors and would be positioned inward only to ensure privacy to neighbouring land and property);
- Temporary set down areas;
- Internal service roads; and
- Site access for the construction, operational and decommissioning phases.

7.5.2 The panels will be arranged in rows in an east-west alignment across the plots and orientated south. The scheme will be operational for 40 years after which all equipment will be removed from site.

### Battery Energy Storage System (BESS)

7.5.1 The Battery Energy Storage System (BESS) will have a capacity to charge, store and export up to 50MVA of electricity to the local distribution network. The facility will provide balancing services to National Grid to ensure the future security of the country's electricity supply. The facility will provide power to the local distribution network in a short space of time when demand is greater than available supply.

7.5.2 The BESS compound is located within deployment area one near the site access,

measuring approximately 1ha and will be surfaced in gravel. The BESS will comprise of c. 20 battery container units with each battery container accommodating 2.5MW of capacity. The battery container units have a similar appearance to shipping containers and measure typically 18.6m in length (including the air cooling and heating units at either end), 2.44m wide and 3.1m in height. See Drawing No. **SRE1113/02/11** (Doc Ref. 2.011).

- 7.5.3 The batteries will sit in bays of two surrounded by 3m high concrete firewalls. The batteries will operate whenever called upon by the National Grid. But as electrical demand is greatest in the morning and early evening this is when the facility is most likely to be delivering power to the grid. A c.4m high acoustic fence will surround the BESS compound, details of which are provided on Drawing No. **SRE1113/02/21** (Doc Ref. 2.21).

#### Point of Connection

- 7.5.1 The proposed point of connection is located at the onsite pylon located within DA1 immediately north of the proposed BESS compound. A customer substation is to be located within the BESS compound and from here a cable will connect directly into the existing onsite pylon. DA2 and DA3 will be connected to the main customer substation at DA1 by underground cabling which will be located within the adopted highway or within land where agreement is in place with the landowner.

#### Site Security

- 7.5.1 The solar farm deployment areas will be secured by a c. 2m high stock fence (deer type, timber post and wire) or similar. Infra-red (non-visible at night), inward facing pole mounted CCTV cameras (c. 2.5m – 3m in height) will also be provided at between 50m and 100m intervals along the boundary fence. These will enable remote surveillance of the site. Fencing and CCTV camera details are presented on Drawing No. **SRE1113/02/16**. The CCTV cameras will be positioned to avoid views of any private property.
- 7.5.2 The BESS compound will be secured by a 4m high acoustic fence as illustrated on Drawing No. **SRE1113/02/21** (Doc Ref. 2.21).
- 7.5.1 Chapter 5 of the ES details how the scheme has evolved through the design and consultation process, but in summary the consideration of landscape and visual issues has been key in refining the layout of the proposed development and has led to the removal of a number of areas of solar arrays, to form buffers to sensitive receptors.

## 7.6 VISUAL ASSESSMENT – BASELINE CONDITIONS

### Zone of Theoretical Visibility (ZTV)

- 7.6.1 As discussed in the methodology, land that may potentially be visually connected with the proposed development has been identified and mapped at the outset in accordance with paragraph 6.6 of GLVIA 3. ZTV mapping has been produced to determine the area over which the proposed development theoretically could be seen. ZTV maps are generated by a computer from a Digital Terrain Model (DTM) representing the bare ground topography, with visual barriers added, overlaid on a map base.
- 7.6.2 The ZTV indicates the maximum theoretical area in which the proposed development

may be visible. The analysis was carried out using representative height points spaced within the internal Development Areas, at a height of 3m above ground level.

- 7.6.3 The analysis uses map data (taken from Ordnance Survey Vector Map District) and includes the addition of the 'Building' layer, modelled at an assumed average height of 8m above ground level, and the 'Woodland' layer, modelled at an assumed average height of 12m above ground level.
- 7.6.4 The addition of these visual barriers over the bare earth topographic model provides a more realistic indication of the potential visibility of the development within the local landscape setting. Visibility mapping is presented on 1:10,000 scale OS base mapping. Areas with theoretical visibility at represented height points arranged within the site (at least one) to a height of 3m above ground level are shaded.
- 7.6.5 Visibility levels are further refined through the site survey and consideration of visibility from the identified receptors, settlements, recreational routes, landscape receptors and through the viewpoint assessment.
- 7.6.6 Visibility mapping to the 3 DAs is provided to a 2.5 km study area, illustrated on the following figures (**Appendix 7.3**, Doc Ref 4.01.7c):
- Figure 7.13, SRE1113/09/13, Zone of Theoretical Visibility (ZTV) plan – No Visual Barriers.
  - Figure 7.14, SRE1113/09/14, Zone of Theoretical Visibility (ZTV) plan – Visual Barriers.

#### Geographical Extent of Visibility

- 7.6.7 The ZTV with barriers is discussed as this is considered to provide the most representative illustration of theoretical visibility. The geographical extent of visibility is influenced by the landscape setting and established features (mature woodland blocks) around the site, the scale of the proposed development (up to c. 3m tall solar panels) set within a number of fenced solar deployment areas, bordering areas of mature scrub and tree cover at various elevations
- 7.6.8 With regard to visual barriers, there are few buildings / settlements close to the site to restrict wider visibility, however, there numerous mature hedgerows and hedgerow tree blocks that are not mapped by OS that would combine to restrict visibility substantially further. Extensive visibility is shown over the gently rising pasture farmland to the north approaching the village of Bonvilston. Visibility is shown the southern fringes of the village only, not extending past the first line of buildings. This area of the village (and footpaths to the south) would have theoretical visibility to part of the DA1 only.
- 7.6.9 Theoretical visibility is shown to the west of DA1 over the upper Llancarfen Valley area, an area of pasture farming with limited numbers of individual properties and public footpaths. The area contains a network of mature hedges and tree blocks which would screen visibility further.
- 7.6.10 Extensive theoretical visibility is shown over the central zone of the study area, focussed on the A4226 corridor as it passes between DA1 and DA2. This area contains a limited number of individual farmsteads and public footpaths. Visibility to the north

east is restricted, extending to the settlement of St Nicholas, albeit only small areas of the site are predicted to be theoretically visible, focussed to the area of DA2.

- 7.6.11 Limited levels of visibility are shown to the east, focussed to the rising hillsides approaching the area of St Lythans Down, on the edge of the study area. This area contains individual residential, a network of public footpaths and a cumulative solar scheme. Theoretical visibility over the south eastern quadrant of the study area is extremely limited, views screened by the near woodland around the site, particularly that to the south of DA2. No visibility is shown over Duffryn Gardens and very limited theoretical visibility is shown over the operational cumulative solar scheme to the south of DA2.
- 7.6.12 There is very limited theoretical visibility to the south / south west of the study area, visibility is generally restricted by the mature woodland blocks surrounding the Oaklands landholding, DA 3. Distant visibility is shown over of the Llancarfen Valley and valley sides to the south west, extending to the village on the edge of the study area. In reality it is considered all views from this area would be screened by mature vegetation, hedges and hedge trees / blocks in the valley area that would act as visual barriers.
- 7.6.13 Distant theoretical visibility is shown from the rising land on the north western fringes of the study area, including an operational solar farm.
- 7.6.14 It is noted that the ZTV was used to inform the locations of the viewpoints. Levels of visibility will be refined further within the viewpoint assessment.

## 7.7 POTENTIAL RECEPTORS

- 7.7.1 The key visual receptors within the study area will consist of (people within) settlements, users of public rights of way (cycle ways and footpaths), and users of recreational facilities, transportation and public access networks. Registered parks and gardens and country parks are considered in the landscape baseline and effects sections, but views are only considered where a view is a key component of the designated landscape.

### Settlements

- 7.7.2 Settlements are considered to have a high sensitivity to visual change as there is the potential for large numbers of receptors (people) to be concentrated in these areas. It should be noted that many individual dwellings and dwellings within settlements, even when close to other proposed developments, may have 'no' or 'limited visibility' of the proposed development. For each individual property close to the development site, the exact degree of visibility will depend on the orientation of the property, the orientation of the windows in the property, and the degree of screening provided by trees, hedgerows, vegetation and surrounding buildings. Individual properties within 500m of the site (grouped where appropriate) are considered in addition to settlements. Measurements are approximate to the closest of the grouping.
- 7.7.3 All receptors are listed at this stage, the assessment stage will, with reference to the ZTV, exclude receptors that are shown to have no theoretical visibility (i.e. screened by landform, buildings or woodland).
- 7.7.4 Residential properties and (individual groups) within 500m of the Development Areas

include:

- R1 - PENCARREG HOUSE. c.26.6m
- R2 - SELF BUILD ECO-DWELLING. OAKLANDS FARM. c.44m (Landowner for DA3)
- R3 - 2. WHITEWELL COTTAGES. BONVILSTON. c.48.9m
- R4 - BUNGALOW AT TY TANDDERWEN. BONVILSTON. c.53.5m
- R5 - 1. WHITEWELL COTTAGES. BONVILSTON. c.53.7m
- R6 - TYN Y COED FARM. BONVILSTON. c.71.4m
- R7 - TY TANDDERWEN. BONVILSTON. c.101.3m
- R8 - YSGUBORWEN. BONVILSTON. c.114.3m
- R9 - BUNKHOUSE. AMELIA TRUST FARM. WALTERSTON. c.155.9m
- R10 - TY NANT BUNGALOW. BONVILSTON. c.160.5m
- R11 - PUPIL REFERRAL. AMELIA TRUST FARM. WALTERSTON. c.162.0m
- R12 - AMELIA TRUST FARM. WALTERSTON. c.171.6m
- R13 - VISITORS CENTRE. AMELIA TRUST FARM. c.178.9m
- R14 - GREENDOWN. BONVILSTON. c.182.7m
- R15 - GYMNASIUM. AMELIA TRUST FARM. WALTERSTON. c.192.9m
- R16 - BLACKLAND FARM. c.198.2m
- R17 - ANNEXE. BROOKLANDS. BROOK LANE. ST NICHOLAS. c.202.5m
- R18 - BROOKLANDS. BROOK LANE. ST NICHOLAS. c.202.5m
- R19 - WHITTON ROSSER. WALTERSTON. BARRY. c.203.9m
- R20 - LLANGEINNITH. WHITTON ROSSER. WALTERSTON. c.203.9m
- R21 - THE PADDOCKS. BONVILSTON. c.219.2m
- R22 - TIRNANT. BROOK LANE. ST NICHOLAS. c.223.4m
- R23 - WILD MEADOW COTTAGE. BONVILSTON. c.231.3m
- R24 - THE CWM. BROOK LANE. ST NICHOLAS. c.247.5m
- R25 - ASH TREE HOUSE. BONVILSTON. c.313.4m
- R26 - REDLANDS COURT FARM. BONVILSTON. c.331.2m
- R27 - SELF CATERING HOLIDAY UNIT. REDLANDS FARM. BONVILSTON. c.383m
- R28 - REDLANDS FARM. BONVILSTON. CF5 6TQ. c.378m (Landowner for DA2)
- R29 - REDLANDS HOUSE. BONVILSTON. c.363.0m
- R30 - LIVING ACCOMMODATION. SPRINGFIELD. BONVILSTON. c.464.4m

- R31 - THE BEECHES. ST NICHOLAS. c.514.0m / 476.1m (garden)
- R32 - 2. TREHILL COTTAGES. ST NICHOLAS. c.514.3m / 461.2m (garden)
- R33 - 1. TREHILL COTTAGES. ST NICHOLAS. c.517.1m / 466.9m (garden)
- R34 - VALEVIEW. ST NICHOLAS. c.517.7m / 472.9m (garden)
- R35 - THE CHASE. BROOK LANE. ST NICHOLAS. c. 534.6m / 495.5m (garden)

7.7.5 Settlements within 2.5km:

- Bonvilston c750m north of DA 1
- St Nicholas c.560 north east of DA 2 and 1.15km northeast of DA 1
- Dyffryn c 1.3km south east of DA 2

7.7.6 The following settlements are within the study area but lie outside the ZTV and are therefore to be scoped out of detailed assessment:

- Llancarfan
- Llantrithyd
- Moulton
- Walterston

*\*Distances quoted from the boundary of the Development Areas to the closest area of the settlement / settlement group.*

### Recreational Routes

7.7.7 The Public Rights of Way (PROWs) (within 500 m) surrounding the Development Areas with the potential for theoretical visibility include:

- PROW VG|L5|28/2 White Wells to Leach Castle Farm c.120m from the western site boundary of DA 1
- PROW VG|L5|28/3 Abernant farm to White Wells c.120m from the western site boundary of DA 1
- PROW VG|L5|28/4 c.50m from the western site boundary of DA 1
- PROW Group VG|L5|29/2, VG|B2|13/1 and VG|B2|14/1 Liege Manor to A48 c.750m northwest of DA 1
- PROW Group VG/B2 15, 16,17,18 and 19 Ty'n-y-coed to Bonvilston c.170m to the north of DA 1
- PROW Group VG|S11|9/1 A4226 to A48 St Nicholas c.100m north of DA 2 Redlands and 100m northeast from DA 1
- PROW Group VG|S11|8/1, VG|S11|8/2 and VG|S11|7/1 A48 St Nicholas to Tinkinswood 410m northeast of DA 2
- PROW Group VG|S11|7/2, VG/S11/7/3 and VG/S11/13/1 Tinkinswood to Dyffryn c. 490m to the east of DA 2. The 'Valeways Millennium Heritage Trail' regional route.

7.7.8 Due to the large number of recreational routes within the study area only those within

500m of the solar deployment areas will be considered in the assessment, unless they are part of a higher sensitivity route (although there are no further regional walking or cycling routes within the study area). Effects upon users of the PROW are considered unlikely to be of a significant nature at distances greater than 500m from the site boundary.

### Key Transport Routes

7.7.9 The main roads within 500m of the proposed development with the potential for theoretical visibility include:

- A4226 (Five Mile Lane) which passes between DA's 1 and 2.
- A48, c.490m north of DA 3 and c.750m to the north of DA 1

7.7.10 The minor roads within 500m of the proposed development with the potential for theoretical visibility include:

- Unnamed Road between A48 and Pancross (West of Development Area 1), passes to immediate west of Development Area 1 c.15m from the solar deployment at southeast corner.
- Brook Lane (non through route), c.350m north east of Development Area 2.

### Selected Recreational / Cultural Designations

7.7.11 Designated heritage assets including; Listed buildings, Conservation Areas and Scheduled Ancient Monuments will be considered independently in the Cultural Heritage Assessment (where applicable) - see ES Chapter 10.

#### Registered Park and Garden

7.7.12 Within the study area, the nearest important visitor destination is Dyffryn House and RPG Registered Park and Gardens (Refer to details under Landscape Receptors and the assessment of landscape receptors within the Landscape Assessment).

#### Cottrell Park Golf Resort, St Nicholas

7.7.13 Located to the north of A48 between Bonvilston and St Nicholas, the Cotrell Park Golf and Country Club Resort takes up a significant area of land to the immediate north of the A48 effectively conjoining the neighbouring villages. It includes 2 Championship courses, Nature Trail as well as meeting and conference facilities.

### Viewpoint Assessment

7.7.14 Seventeen viewpoints have been selected on the basis that they provide views to (or illustrate the limited visibility) of the proposed development from sensitive receptors (residential, recreational and PROW), and are representative or locations within the study area. A full list of viewpoints including: a description of location; justification for selection; and approximate distance from the site and baseline views is included in table within **Appendix 7.5** (Doc Ref. 4.01.7e).

7.7.15 The viewpoints were discussed and agreed with Vale of Glamorgan Council prior to the assessment process, the locations of the viewpoints are illustrated on Figure 7.16 Viewpoint Location Plan in **Appendix 7.3** (Doc Ref. 4.01.7c).

7.7.16 Baseline views are considered with reference to:



- The type and relative nature of people (visual receptors) likely to be affected with consideration of the activities they are involved in.
- The location, nature and characteristics of the chosen viewpoints (representative, specific and illustrative).
- The nature, direction, composition and characteristics of the existing views experienced at the viewpoints; and
- The visual characteristics and elements of the existing views e.g. nature and extent of skyline, aspects of visual scale and proportion, landform or other elements that may interrupt or otherwise influence views.

7.7.17 The baseline photographs are included on the Photomontage and Viewpoint Sheets, **Appendix 7.4** (Doc Ref. 4.01.7d) The viewpoints are listed below, and the baseline conditions of the viewpoints are described in Section 5.2 of **Appendix 7.5** (Doc Ref. 4.01.7e).

- VP1 - Development Area 1 entrance, 'Pancross', Five Mile Lane / A4226.
- VP2 - Development Area 2 entrance, 'Redlands', Five Mile Lane / A4226
- VP3 - Public Footpath to the South East of Redlands Farm
- VP4 - Public Footpath close to Whitewell Cottages, Llancarfen Valley
- VP5 - Public footpath VG|B2|13/1 between Bonvilston and Llancarfan Valley
- VP6 - Public Footpath, Bonvilston
- VP7 - Public Footpath, Brook Lane, St Nicholas
- VP8 - A4226, Five Mile Lane
- VP9 - Valeways Millennium Heritage Trail PROW, Near Tinkinswood Burial Chamber
- VP10 - Dyffryn (Car Park) Registered Park and Garden
- VP11 - Whitton Mawr, close to A4226
- VP12 - A4226, close to Redlands Farm grouping
- VP13 - West Llancarfan, road verge north of Caemaen Farm
- VP14 - Public Footpath, west of Llantrithyd Place RPG
- VP15 - St Lythans Down
- VP16 - North of Llancarfan
- VP17 - Lillypot (north of Bonvilston)

7.7.18 The viewpoints are considered within the visual assessment section and **Appendix 7.5** (Doc Ref. 4.01.7e), supplemented with photomontages of the Development Areas from selected locations.

## 7.8 LANDSCAPE AND VISUAL MITIGATION MEASURES

7.8.1 Landscape, visual and biodiversity enhancements are an inherent part of the proposed development and assessment process. The mitigation proposals incorporate features primarily for landscape and visual reasons but are additionally informed by the findings of the ecological and cultural heritage assessments.

- 7.8.2 Landscape and Visual mitigation seek to integrate the development into the local landscape, screen and filter views to the site from sensitive receptors and provide landscape (and often ecological) enhancement using un-utilised land within the site development areas, and off site if considered necessary.
- 7.8.3 The layout of the arrays within the site area is designed so that the existing mature hedgerows, tree cover and scrub around and within the site boundaries can be retained. Appropriate buffers are integrated into the vegetation (typically a minimum of 4m from vegetation to the site boundary fence and a further 4m from the fence to the solar arrays) with development restricted from within the canopy of trees, particularly notable in Development Area 2 (Redlands Farm). The site areas will be accessed from the existing adopted highway and then a limited series of crushed gravel access tracks.
- 7.8.4 The construction process of the solar arrays, the main land use feature of the development, is of a light footprint as the steel posts (of the panel frames) are driven into the ground with no foundations required. This construction method is of a minimal disturbance to ground conditions, the land cover of the field can remain as grassland and the field remains available for low intensity grazing or left as fallow, part retaining the current agricultural landscape characteristic of the site areas. Security fencing around the site will be 2m high timber posts and wire mesh, reflecting the rural character of the wider area.
- 7.8.5 A full Landscape and Ecological Management Plan will be produced in support of the application (assumed required via pre-commencement condition), that will include the measures to reduce impacts during construction and the management measures during operation for the life of the scheme. The management will include all relevant details for 40 years operation, including who will manage the Site and ongoing monitoring.
- 7.8.6 Chapter 5 of the Environmental Statement and the Design and Access Statement explain how the site layout has evolved to respond to the findings of the consultation process and to the landscape / visual and biodiversity context.
- 7.8.7 Mitigation proposals should be read in conjunction with Fig 7.18 Landscape and Mitigation Masterplan.
- 7.8.8 In summary, the proposed development will provide the following landscape and biodiversity enhancements:
- Manage grassland within the solar deployment zones to create a diverse sward between and around the solar arrays, of tussock grassland, for low Intensity management areas, or available for grazing by sheep (annual cut or grazing)
  - Manage grassland margins outside of the solar deployment zones for biodiversity, the grassland fringes (low maintenance perennial meadow mix) will provide enhanced habitat fringes and contribute to increasing biodiversity levels in the local area. The grass will be subject to a low intensity management regime (cut every 2 years). These grassland fringes will provide enhanced habitat for reptiles, invertebrates and birds overall contributing to improved biodiversity levels in the local area. The areas of tussock grassland would act as a reservoir of grassland invertebrates particularly over winter which may also benefit local bird species and small mammals.
  - Reinforce existing hedgerows to improve visual containment of solar

deployment areas (gapping up and growth to a greater height). Where appropriate on the boundary adjoining receptors (residential, roads and footpaths) the hedge will be allowed to grow up to at least c.3m tall to help to screen visibility from publicly accessible areas to the solar farm.

- Improve landscape structure of Development Area 1 (Pancross Farm) with the reinstatement of some lost historic hedgerows to restore the historic field structure, for both landscape / visual and ecological benefits.
- Maintain a minimum offset distance of at least 50m from all residential receptors that will remain clear of all development.
- Additional standard sized hedge trees to be planted along the new hedgerows within the western area of Development Area 1, the Llancarfen Historic Landscape Area at random spacings. The planting will increase local tree coverage, filter visibility from sensitive receptors and provide green links between existing woodland areas.
- A landscape and ecological management plan will be devised and adhered to for all retained and created habitats in order for them to maintain existing value and/or realise enhanced value, making sure that management is appropriate and ongoing for the life of the development;

#### Hedgerow Specific Mitigation

- 7.8.9 All hedges are to be retained around the site, with infilling of the gaps of missing sections undertaken. In addition to benefiting landscape and screening any visual issues, the retention of hedges will ensure that foraging, refuge and hibernation opportunities, protection from predators, and connectivity between habitats for wildlife within the local area is maintained and enhanced.
- 7.8.10 Retained hedgerows will undergo sympathetic hedgerow management throughout the life of the solar farm, thus providing landscape and ecological benefits. Outline hedgerow management recommendations include:
- Hedges will be trimmed at three year intervals at the most and maintained at a height of at least 2.5m with sections extending up 4m;
  - At least 30% of site hedges will be left to grow for at least seven to ten years (most likely on the northern boundary of the site to avoid shading);
  - Ensure rotationally only 30% of hedges are cut in any one year, to allow hedge trees to fruit heavily;
  - Laying will be used to manage hedgerows that become 'gappy' or lack dense branches at their base; and
  - If hedgerow size needs to be restricted, hedges will be cut on one side and not the top (but within a maximum height of ~3m – 4m).
  - At the end of the operation, after decommissioning, the site will be reinstated to previous use, grass pasture.

#### Proposed Mitigation - Approximate Areas / Quantities, whole site

- 7.8.11 The mitigation treatments and existing features are shown on the proposed Landscape and Mitigation Masterplan, Figure 7.18.

**Table 7.3: Whole Site - Proposed Landscape Planting / Area Schedule**

Development Area 4 - Mitigation Treatment	Number / Area
Tussock Grassland with solar deployment zones security fencing	DA1 Pancross c.559,000m <sup>2</sup> (55.9 ha.) DA2 Redlands c.319,000m <sup>2</sup> (31.9 ha.) DA3 Oaklands c.149,000m <sup>2</sup> (14.9 ha.)
Meadow Grassland within site boundary, but outside of security fencing, set aside for landscape / biodiversity benefit.	c.245,000m <sup>2</sup> . (24.5 ha.)
Total area of solar arrays V total site area	Solar arrays coverage: 270,070m <sup>2</sup> Total red line boundary area: 1,271,807m <sup>2</sup> Ground coverage of c. 21.2% solar arrays
Retained grass pasture field within Development Area 1	c.32,000m <sup>2</sup> (3.2 ha.)
Retained grass pasture field within Development Area 2	c.27,250m <sup>2</sup> (2.72 ha.)
Proposed Native Hedgerows (new) <i>Infill areas to be subject to separate detailed site survey.</i>	c.1670 l/m
Proposed Hedgerow Trees (western area of Development Area 1)	c.15 no.
Proposed Native Woodland / Scrub	n/a – existing site vegetation retained
Length of existing hedgerows around and within site (retained and protected)	All existing hedgerows retained
Total number of PV Panels	c.145,008
Total area of gravel tracks	19,296m <sup>2</sup> , length: 4,824m:
Areas of BESS Compound	c.9,168m <sup>2</sup>

- 7.8.1 Within the Vale of Glamorgan Landscape Character Assessment (LCA), the principles for landscape management and for accommodating new development within the particular LCA areas is outlined. It is considered that the proposed mitigation and enhancement measures will help to contribute towards these goals.
- 7.8.2 Overall, the mitigation and enhancement proposals seek to reduce the landscape effects of the solar deployment areas and integrate the site within the host LCA areas. Mitigation proposals are also developed to screen and filter the development from the view of sensitive receptors, whilst also providing a range of ecological mitigation enhancements. The mitigation proposal, coupled with ongoing management are considered to be a benefit over the current grazed pasture / silage crops land use of the 3 Development Areas which is discussed further in the ecological chapter.

#### Construction and Decommissioning Phase Mitigation

- 7.8.3 Aside from the minor access improvements, due to the method of construction there will be minimal other physical changes to the structure of the fields. This will reduce the potential for long term landscape effects of the scheme and allowing ease of restoration and a change back to full scale pastoral use when the scheme is decommissioned.

7.8.4 Specific mitigation measures considered during the construction phase relevant to landscape and visual issues include:

- There will be limited vegetation loss, the existing access points and farm tracks will be used. Access tracks for construction will largely follow existing farm tracks and utilising existing entrances. The existing farm tracks within the site will be improved as required by adding stone/granular material which will weather over time. Where additional temporary tracks are required for construction, these will be created using interlocking sheet material to avoid longer term soils damage; and
- The temporary construction compounds will be located within Development Areas 1 (Pancross) and 2 (Redlands) (see Drawing **SRE1113/02/24**, Doc Ref. 2.24) minimising direct and indirect effects on landscape elements, landscape character and visual receptors.

7.8.5 The proposed development will be operational for 40 years, at the end of which it can be decommissioned and removed, and the site reinstated to previous conditions.

7.8.6 Specific mitigation measures, considered during the decommissioning phase relevant to landscape and visual issues include:

- The temporary de-commissioning compound and all disturbed and excavated areas will be reinstated following completion of de-commissioning activities. Any concrete foundations (if used) will be broken up, removed and earth reinstated to make up levels;
- There will be no vegetation loss, mitigation vegetation likely to remain as landscape features as appropriate;
- Existing entrances, tracks and access points will be used (including temporary access tracks where required); and
- The site will be reinstated to previous use, grass pasture.

## 7.9 ASSESSMENT LEVEL OF LANDSCAPE EFFECT

### introduction

7.9.1 In order to assess whether landscape character is 'significantly' affected by a development, it should be determined what and how each of the key characteristics would be affected. The judgement of magnitude therefore reflects the degree to which the key characteristics and elements which form those characteristics will be altered by the proposals. The scale of the development, the nature and sensitivity of the receiving landscape, and local 'barriers' in the landscape (such as breaks of topography, woodlands, settlements, and roads or rivers) will influence the exact extent of effect of the development. The assessment focuses on the operational phase. Temporary and short-term effects during the construction and decommissioning phases are discussed following the main effects where applicable.

7.9.2 Landscape assessment involves assessing the sensitivity of a landscape receptor against the magnitude of change that will be likely to be caused by a development to evaluate the significance of effects upon that receptor.

7.9.3 The significance of the effect of a development on the landscape is not an absolute

scale, but is a judgement based on the magnitude of the anticipated effect (or scale of change) and the sensitivity of the landscape to development.

Effects on Landscape Character - Landscape Character Areas, Landmap Aspect Areas and Landscape Receptors

- 7.9.4 The landscape resource is assessed in terms of sensitivity, which combines judgements of their susceptibility to the type of change or development concerned, and the value attached to the landscape. Sensitivity is specific to the project/development under consideration.
- 7.9.5 Landscape characteristics of the application site and consequences of the development upon the landscape character of the development areas (and wider study area) is considered. The assessment includes the host and near adjoining landscape character areas (LCA 16, LCA 17, LCA 22 and LCA 23). In addition, consideration is given to landscape effects upon the host LANDMAP Aspect Areas and those within the study area selected for further consideration due to higher level classifications as discussed within Section 7.4.
- 7.9.6 Detailed assessment tables are included with **Appendix 7.5** (Doc Ref. 4.01.7e) and are summarised in the below table.

**Table 7.4: Assessment of Landscape Effect (at Year 10) - Summary Table**

Receptor	Landscape Sensitivity	Magnitude of Landscape Effect	Level of Landscape Effect (SIGNIFICANCE)	Comment
LCA 16: Central Slopes And Valleys	Medium	Medium	<b>Moderate/Minor (Not Significant)</b>	Host area for DA 1 & DA 3 & west half of DA 2
LCA 17: Llancarfan And Lower Waycock Valleys	High	Low	<b>Minor / Neutral (Not Significant)</b>	Western edge of DA 1 & southern edge of DA 2
LCA 23 - St Nicholas And Bonvilston Ridge Crest	Medium	Low	<b>Minor (Not Significant)</b>	Ridge to the north of all 3 DA's and A48 corridor
<b>LANDMAP</b>				
<b>Visual and Sensory</b>				
VLFGVLS146: Central Vale Ridges and Slopes (HOST)	Medium (moderate evaluation)	Medium-Low	<b>Moderate / Minor (Not Significant)</b>	Host area for DA 1,2 and west half of DA 3

Receptor	Landscape Sensitivity	Magnitude of Landscape Effect	Level of Landscape Effect (SIGNIFICANCE)	Comment
VLFGGLVS271: St Nicholas and Bonvilston Ridge Crest	High evaluation	Low	<b>Minor (Not Significant)</b>	Ridge to the north of all 3 DA's and A48 corridor
VLFGGLVS453: Llancarfan and Waycock Valleys	High evaluation	Low	<b>Minor (Not Significant)</b>	Western edge of DA 1 & southern edge of DA 2
VLFGGLVS608: Upper Waycock Valley / Dyffryn Area	High evaluation	Medium-Low	<b>Moderate / Minor (Not Significant)</b>	Eastern half of DA 2
<b>Geological Landscape</b>				
VLFGGLGL170 Moulton	Medium (moderate evaluation)	No Change	<b>Neutral (Not Significant landscape effect, geological)</b>	Most of DA 1 and DA 2
VLFGGLGL282 St Hilary	High evaluation	No Change	<b>Neutral (Not Significant landscape effect, geological)</b>	DA 2 and west/north fringe of DA 1
VLFGGLGL749 Wenvoe	High evaluation	No Change	<b>Neutral (Not Significant landscape effect, geological)</b>	East of DA 2
VLFGGLGL532 Pendolyan	High evaluation	No Change	<b>Neutral (Not Significant landscape effect, geological)</b>	Outside of 1km from the DAs
<b>Landscape Habitats</b>				
VLFGLLH582 Ogmore-Llantwit Arable Belt (HOST)	Medium (moderate evaluation)	Low	<b>Minor (Not Significant landscape effect, landscape habitats)</b>	Host for DA 1 and 3

Receptor	Landscape Sensitivity	Magnitude of Landscape Effect	Level of Landscape Effect (SIGNIFICANCE)	Comment
VLFGLLH958 Barry North (HOST)	Medium (moderate evaluation)	Low	<b>Minor (Not Significant landscape effect, landscape habitats)</b>	Host for DA 2
VLFGLLH840-Rhose-Moulton	Medium (moderate evaluation)	No Change	<b>Neutral (Not Significant landscape effect, landscape habitats)</b>	Within 500m south of DA's
VLFGLLH786 Aberthaw River Valleys	Unassessed	Negligible	<b>Neutral (Not Significant landscape effect, landscape habitats)</b>	Adjoins DA 1 and 2
<b>Historic Landscape</b>				
VLFGHLH032 Llancarfan (HOST)	Very High, Outstanding Landmap evaluation	Low	<b>Moderate (Not Significant landscape effect historic landscape)</b>	Host for DA 1 and 3
VLFGHLH050 Dyffryn	Very High, Outstanding Landmap evaluation	Low	<b>Moderate (Not Significant landscape effect historic landscape)</b>	Host for DA 3
VLFGHLH027 Dyffryn Gardens	Very High, Outstanding Landmap evaluation	No Change	<b>Neutral (Not Significant landscape effect historic landscape)</b>	South east of the DA's
VLFGHLH022 A48 Lougher to Chepstow communication	Very High, Outstanding, Landmap evaluation	Negligible	<b>Minor (Not Significant landscape effect historic landscape)</b>	600m+ to the north of DA's
<b>Cultural Landscape Services</b>				
VLFGCLCS008 Central Vale Ridges and Slopes	n/a	Not assessed	n/a	
VLFGCLCS027	n/a	Not assessed	n/a	



Receptor	Landscape Sensitivity	Magnitude of Landscape Effect	Level of Landscape Effect (SIGNIFICANCE)	Comment
Llancarfan and Waycock Valleys				
VLFGLCLS036 Upper Waycock Valley/Dyffryn Area	n/a	Not assessed	n/a	
Landscape Receptors				
Special Landscape Areas				
Nant Llancarfan (SLA 4)	Medium	Low	<b>Minor - Neutral, a Not Significant</b> landscape effect upon the SLA	Western half of study Area below A48 and west of A4226
Dyffryn Basin And Slopes (SLA 5)	Medium	Low	<b>Minor - Neutral, a Not Significant</b> landscape effect upon the SLA	Eastern half of study Area below A48 and east of A4226
Upper and Lower Thaw Valley (SLA 2)	SLA's located to the north of A48 corridor are scoped out of the assessment as it is considered the development has limited potential to have any landscape effects on areas to the north of the road corridor given the limited intervisibility and distinct character which will not be adversely impacted.			
Ely Valley and Ridge Slopes (SLA )3				

7.9.1 As presented in **Appendix 7.5** (Doc Ref. 4.01.7e) and the above table, analysis of the published landscape character assessment and LANDMAP data, considered with the particular characteristics of the study area, has concluded that there would be no significant effects upon landscape character as a result of the development. Due to the scale of the local landscape and LANDMAP areas, the development form and local context (vegetation, built form and topographic elements), the scheme will have a limited but adverse impact on characteristic elements, notably the arable and pastoral landscape pattern and coverage. Despite being considered a Moderate level of effect (at the most adverse) these are effects that are geographically restricted to the Development Areas (3 no. in total) and their immediate context, set within the expansive landscape character and LANDMAP aspect areas within the study area.

#### Site Level Effects on Landscape Character - Landscape Sensitivity

7.9.2 The landscape resource is assessed in terms of sensitivity which combines

judgements of its susceptibility to the type of change or development concerned and the value attached to the landscape. Sensitivity is specific to the project/development under consideration.

- 7.9.3 Landscape characteristics of the application site and consequences of the development (up to ~500m) are considered. The level of effects stated below is at Year 10 following the establishment of mitigation planting (for commentary on the comparative level effect at year 1 refer to the Landscape Assessment tables at **Appendix 7.5**, Doc Ref. 4.01.7e).

#### Site Level (Development Areas) Susceptibility to Change

- 7.9.4 The susceptibility to change of the landscape to the solar farm and battery storage development, within the three Development Areas, is determined with reference to the baseline assessment of the existing landscape and is assessed by considering the ability of the landscape to accommodate the specific proposed development without undue negative consequences for the maintenance of the landscape baseline situation and/or achievement of landscape planning policies or strategies.
- 7.9.5 Considering the scale of the proposed solar farm development specifically (vertical and overall surface area) within the three DAs, local landscape features (rolling, undulating landform which is afforded varying degrees of enclosure from valley side woodlands and associated ridge and valley topography of adjacent areas), the susceptibility to change of the arable and pastoral landscape is considered to be **Medium**. It is accepted that there would be some undue consequences as a result of development, but that the landscape receptor has some capacity to accept change due to the development form and scale.
- 7.9.6 The development would lead to a loss of arable grassland and pastoral grazing land at the local level, although the grazing can still continue at a lower intensity. It is also considered that due to the local levels of enclosure from woodland and intermediate ridges and valley side slopes, the local landscape and immediate surroundings could accommodate this particular form of development without a significant change in local character outside of the site. The development areas contain few landscape characteristics that would be overly vulnerable to the proposal.
- 7.9.7 The Medium classification within this assessment corresponds with the character area sensitivity classifications of Medium for LCA 16. Whilst the adjacent LCA 's score High (LCA 17 and LCA 22) it is considered that only a small part of the sites is covered, and the character as described is only partly representative of that found within the DA's which are a farmed landscape and can be considered as less sensitive than the generally smaller scale and more enclosed surrounding pastoral landscape. A medium classification is defined as, '*Some of the key characteristics and qualities of the landscape are sensitive to change from the type and scale of development being assessed*'.

#### Value of the Landscape Receptor (Site <500m)

- 7.9.8 The value of the landscape receptor, the host arable and pastoral grassland fields of the 3 solar Development Areas (DAs), is considered with regard to the baseline landscape value conclusions.

- 7.9.9 The DAs and surrounding areas (<500m) are subject to regional level landscape designations (SLA and part of DA1 is an historic landscape area) and so do contain some sensitive elements cited in the referenced landscape character, Landmap and sensitivity assessments.
- 7.9.10 The DAs are noted for their landscape condition which does vary from the more intact small to medium scale fields of DA's 2 and 3 to the amalgamated fieldscape of DA1, whilst in good condition, has been subject to greater alteration. All parts of the DA's are considered to be commonplace features within the study area, and as development will be set within the field structure, the main change is the ground coverage, from pastoral and arable grassland to solar farm infrastructure with surrounding mosaic of semi enclosed pastoral grasslands interspersed by small woodland blocks and bordered by wooded slopes which generally form the backdrop to local views. The DAs are noted for their individual scenic quality (quieter areas away from transport corridors and settlement edges) although are not publicly accessible, providing no recreational value. When visible, or close to the development areas, landscape perceptions are also influenced by the local detractors including; the near transport corridors and overhead electricity pylons.
- 7.9.11 It is acknowledged that the visual aesthetic (character) locally of the DAs will change however, the retention and management of surrounding vegetation (acknowledged to be one of the key landscape characteristics) and proposed mitigation will lessen the visual prominence of the solar tables within the DA's, aiding landscape integration.
- 7.9.12 Overall, it is considered that the site areas (3 Development Areas) are of a **Medium** landscape value.
- 7.9.13 In accordance with the LVIA methodology (**Appendix 7.1**, Doc Ref. 4.01.7a), a **Medium** landscape value judgement can be explained as *“Medium importance and rarity, limited potential for substitution...Lies wholly or partially within a designated landscape (SLA/historic landscape area) but where localised character and scenic value is less distinctive or has become degraded. Presents locally distinctive landscape characteristics with some scenic interest. Presents some public amenity by way of views, access biodiversity, cultural or opportunity for quiet enjoyment (relative tranquillity)”*.

#### Overall Sensitivity of the Site and Local Area

- 7.9.14 The susceptibility to change of the local landscape and landscape value indicators are considered Medium and Medium to High (majority of 3 DA's character and immediate context of Medium Value). The landscape sensitivity of the site to the proposed development is therefore concluded to be **Medium** overall, due to the local scale of the development, spread over 3 Development Areas. In accordance with the LVIA methodology, Appendix 7.1, the Development Areas are described as “comprised of commonplace elements and features creating generally unremarkable character, but some sense of place. Elements with a medium susceptibility to change, partly able to accommodate the proposed development without undue consequences but contains few (affected) features that could not be replaced”.
- 7.9.15 Mitigation measures proposed would, over time, improve the landscape and ecological structure and aid the integration of the development, contributing to wider scale

improvements to green infrastructure and local biodiversity gains within the local area.

### Magnitude of Landscape Effects

- 7.9.16 Landscape effects arising as a result of the proposed development are considered with reference to the criteria established in the methodology including size and scale of effect; geographical extent; and duration and reversibility. The type of effect considered includes:
- The potential operational effects upon the landscape fabric within the site (direct effect);
  - The potential operational effects on the host landscape character area (direct effect), including the consideration of any effects within designated areas; and,
  - The potential operational effects on the wider landscape character areas within the study area (indirect effects), including consideration of any effects within designated areas and cumulative landscape effects as a result of other solar farms.
- 7.9.17 The direct effect of the proposed development upon the landscape character of the site and local area depends on; the key characteristics of the receiving environment (as previously considered), and the degree to which the development may be consistent or at odds with the landscape and how the development would be perceived within the landscape. Perceptions can be influenced by; the distance to the site, weather conditions, appearance/fit of the development (levels of visibility), and relationships to other built and natural features in the landscape.
- 7.9.18 It is acknowledged that there is an overlap between perception of change to landscape character and visual amenity; landscape character is derived from the combination pattern of landscape elements in the view. The effects of a development on landscape character arise from its relationship to these combinations and patterns.

### Scale of Effect

- 7.9.19 Consideration is given to the scale of the change in the landscape that is experienced as a result of the development and can include both the loss and addition of new features. The development would result in a change to an area of, arable and pastoral grassland, the total site area of the three DAs is c. 127 ha, of which solar is deployed on c.27 ha (the area within the security fences). Within the deployment areas the solar arrays and infrastructure will cover c.47.2 ha. of the ground area, the remainder is grass. The zones outside the security fences, c.30.4 ha. will be meadow grassland (24.5ha) retained grass pasture, areas of existing hedgerows and trees, or managed for specific ecological purposes e.g. wildflower areas.
- 7.9.20 The main landscape element affected is the arable and pastoral grass coverage within the development areas, as the fields host the development. The fields within the DA's contribute extensively to the landscape character, but this is in conjunction with surrounding hedgerows and woodland blocks, which frame and knit the landscape together. These features are unaffected. The solar arrays within the field systems will alter the local aesthetic aspect, forming notable new features, but contained and set within the established structure. The landscape character areas are of a large scale, the changes to the three DAs will not have notable effects upon the wider distinctive, but commonplace, character. The overall scale of effect is considered to be Moderate,

a partial change to existing landscape elements and characteristics.

#### Geographical Extent

- 7.9.21 The geographical extent of effects is influenced by the landscape setting (established features around the site), the scale of the proposed development, localised topography and is distinct from the scale of effect.
- 7.9.22 Due to the form of development, up to c.3m tall solar arrays, BESS and substation compound set within arable and pastoral field systems, combined with the established landscape features around the site and rolling valley topography, the geographical extent of effect is considered focussed to site level but can extend over immediate localised areas to a maximum of 500m. The geographical extent of effect is **Medium**.

#### Duration and Reversibility of Effect

- 7.9.23 The effects have been assessed over the lifespan (40 years) of the proposed development – effects which are ultimately reversible (and therefore temporary) due to the method of construction (and time limited nature of the application / permission). The solar arrays and battery units and limited ancillary infrastructure could be removed, and the fields returned to pastoral and arable grassland use. Despite being ultimately reversible, a **High-Moderate** level of effect is concluded with regards to duration and reversibility of landscape effects.

#### Overall Magnitude of Effect

- 7.9.24 Magnitude is considered with regard to the scale, geographical extent, and duration and reversibility of landscape effects, as set out in the methodology. The magnitude of landscape change arising from the proposed development is considered to be **Medium**. In accordance with the methodology this is a “Partial loss to landscape elements of the baseline and introduction of elements that may be prominent but not necessarily substantially uncharacteristic with the attributes of the receiving landscape but which could co-characterise parts of the landscape”.

#### Overall Level (Significance) of Landscape Effect

- 7.9.25 The significance of landscape effect of the proposed development upon the local area is determined by consideration of the landscape sensitivity and magnitude of landscape effect.
- 7.9.26 With reference to the evaluation of the landscape effects and with regard to the methodology, a **‘Medium’** landscape sensitivity and a **‘Medium’** magnitude of change is considered to result in a **‘Moderate’** significance of landscape effect overall, as discussed in the methodology this is judged to be **‘Not Significant’** effect overall. The landscape effects are considered to be centred at a local level but will have an adverse impact on commonplace characteristic features (pastoral and arable grassland). It is judged that the development would cause a medium sensitivity landscape to be markedly changed due to the nature of the developments scale, although it is noted effects are largely contained by retained field structure, woodland and topographic features of the local area.

#### Assessment of Predicted Landscape Effect during Construction and Decommissioning Phases

- 7.9.27 Construction activities which have the potential to temporarily affect the landscape character and landscape receptors include:
- Frequency of deliveries to site and vehicle movements on and off site;
  - Effects upon local tranquillity by installation of site infrastructure - fencing with CCTV, solar arrays, switchgear, substation and inverters; and
  - Formation of temporary construction compound (welfare and construction equipment) and reinstatement works to areas disturbed by construction activities.
- 7.9.28 De-commissioning activities which have the potential to affect the landscape character and landscape receptors include:
- Dismantling and removal of all installed infrastructure resulting in increased vehicle movements to and from site;
  - Effects upon local tranquillity through the activity of construction operations (machines and movement); and
  - Reinstatement works to areas disturbed by de-commissioning activities and time period for reinstatement works to establish.
- 7.9.29 From the description of the construction and de-commissioning activities as outlined above, any effects on landscape character and landscape receptors during the construction and de-commissioning phases will be temporary and short term in duration. There would be no direct changes to the landscape immediately outside of the site boundaries (no additional requirements for space), the construction and decommissioning operations retained within.
- 7.9.30 Any damaged fields, as a result of de-commissioning activities, will be re-seeded with a locally appropriate grassland mix. It is therefore considered that the short-term, reversible and temporary nature of the construction and de-commissioning activities on landscape character will ensure that the overall effects will be, at worst, Minor. These are considered to be limited to the local context of the site boundaries, short term and temporary effects, overall a 'Not Significant' nature.

#### Assessment of Predicted Landscape Effect on Landscape Receptors

- 7.9.31 The baseline landscape section established the following landscape receptors within the study area with the potential to be adversely affected by the proposed development. The receptors are considered in further detail within **Appendix 7.5** (Doc Ref. 4.01.7e).

#### Nant Llancarfan and Dyffryn Basin and Slopes Special Landscape Areas

- 7.9.32 The geographical area of the SLA's with the potential for visibility to the DAs has been established following review of the ZTV with barriers (Zone of Theoretical Visibility)
- 7.9.33 Due to the limited vertical scale of the solar arrays and the rolling farmland landscape, with hedgerow field boundaries and woodland blocks to adjoining slopes and valleys, the effects on the SLA are concentrated to the site and its immediate setting and defined areas of intervisibility further afield as evidenced by the ZTV. These include fields directly to the north of DA 1 Pancross below Bonvilston and A48 road corridor and a small part of the landscape to the immediate east of DA 2 Redlands to the north of Dyffryn up to a distance ~500m. Elsewhere within the SLA's visibility is much more

constrained around the 3 DA's.

- 7.9.34 In general, the more sensitive and characteristic features of the SLA's are located in distinct areas to the south, south west and south east in the Nant Valley and around the settlements of Llancarfan and Dyffryn which are characterised by more intimate small scale pastures interspersed by woodland which together with local ridge and valley topography separates them from the context of the site.
- 7.9.35 Considering the separation distances and potential for intervening screening by vegetation (and with reference to the Viewpoints close to the site within the 2 SLA's covering the two halves of the study area to the south of the A48) it is considered that the landscape effects upon the setting of the SLA, as a result of the development would be **Moderate at Year 1** reducing to **Minor at Year 10** (following successful establishment of mitigation hedgerows and tree planting) which are – **'Not Significant'** Landscape effects.

#### The Registered Historic Landscape of Llancarfan (HLW (SG) 1)

- 7.9.36 The geographical area of Llancarfan Historic Landscape Area (HLA) with the potential for visibility to the DAs has been established following review of the ZTV with barriers (Zone of Theoretical Visibility) . This established that the development areas only occupy a small part of the HLA inclusive of the western part of DA 1 Pancross.
- 7.9.37 The Archaeological Desk Based Assessment stated: 'The overall potential impact on Llancarfan (HLW (SG) 1) will be **Moderate**. This was due to the fact that whilst the site has potential for pre historic and medieval activity to be evidenced, to date the majority of known identified historic features and characteristics are related to post medieval agricultural and industrial uses which are of a low archaeological value. Therefore, the site is considered to be less susceptible to change than the surrounding smaller scale historic fieldscapes which are more intact and less likely to have seen the levels of disturbance seen within the 'Bonvilston Amalgamated Fieldscape' area of historic landscape which partly covers the site.
- 7.9.38 Effects on historic features would be localised and likely to be of a lower level than that which could potentially occur within historic field systems outside of the site would not be adversely affected, it is considered that the landscape effects upon the setting of Llancarfan HLA, as a result the development would be **Minor (in landscape terms)– a 'Not Significant'** Landscape effect.

#### Dyffryn Registered Park and Gardens

- 7.9.39 Analysis of the ZTV with barriers (Zone of Theoretical Visibility) established that in common with the 3 other RPG's located within the study area, that the site and setting of the closest Dyffryn RRG, would have no intervisibility with the site (3 DA's). As a result, there would be no direct effects upon the House and Gardens due to the presence of the solar and battery storage development. This is in accordance with The Archaeological DBA which stated the 'overall potential indirect impact upon all 4 of the Registered Historic Park & Gardens will be Negligible.'
- 7.9.40 Therefore, there would be **No change** and a **Neutral** level of effect which are 'Not Significant' effects on all of the 4 RPG's which are deemed to have no landscape scale connections to the site given they have distinct, well screened wooded settings and

are well separated from the whole site.

## 7.10 ASSESSMENT OF THE LEVEL OF VISUAL EFFECT

### Assessment of Predicted Visual Effect on Residential Properties / Residential Groups

- 7.10.1 As outlined within the baseline section, there are 38 residential receptors / groups within the study area to be assessed which may have visibility to the proposed development, detailed assessment tables are included with **Appendix 7.5** (Doc Ref. 4.01.7e), and a summary is provided in the below table. Effects upon views and visual amenity during the construction and decommissioning phases are considered separately. Residential receptors are illustrated on **Figure 7.20, 7.21 and 7.22**.
- 7.10.2 Following the baseline stage and the review of the ZTVs (Figures 7.13 and 7.14) it is considered that the following properties would have no visibility to the site area. These residential receptors are therefore omitted from the assessment of visual effects, all would experience effects of a 'Not Significant' nature.

#### Omitted Residential Properties

- R2 – SELF BUILD ECO HOME. OAKLANDS FARM. c.44m (Landowner for DA3)
  - R4 - BUNGALOW AT TY TANDDERWEN. BONVILSTON. c.53.5m
  - R7 - TY TANDDERWEN. BONVILSTON. c.101.3m
  - R8 - YSGUBORWEN. BONVILSTON. c.114.3m
  - R9 - BUNKHOUSE. AMELIA TRUST FARM. WALTERSTON. c.155.9m
  - R11 - PUPIL REFERRAL. AMELIA TRUST FARM. WALTERSTON. c.162.0m
  - R12 - AMELIA TRUST FARM. WALTERSTON. c.171.6m
  - R13 - VISITORS CENTRE. AMELIA TRUST FARM. c.178.9m
  - R15 - GYMNASIUM. AMELIA TRUST FARM. WALTERSTON. c.192.9m
  - R19 - WHITTON ROSSER. WALTERSTON. BARRY. c.203.9m
  - R20 - LLANGEINNITH. WHITTON ROSSER. WALTERSTON. c.203.9m
  - R27 - SELF CATERING HOLIDAY UNIT. REDLANDS FARM. BONVILSTON. c.383m
  - R28 - REDLANDS FARM. BONVILSTON. CF5 6TQ. c.378m (Landowner for DA2)
  - R30 - LIVING ACCOMMODATION. SPRINGFIELD. BONVILSTON. c.464.4m
  - R31 - THE BEECHES. ST NICHOLAS. c.514.0m / 476.1m (garden)
  - R33 - 1. TREHILL COTTAGES. ST NICHOLAS. c.517.1m / 466.9m (garden)
  - R34 - VALEVIEW. ST NICHOLAS. c.517.7m / 472.9m (garden)
- 7.10.3 Residential properties to be assessed and (individual groups) within 500m of the Development Areas include:
- R1 - PENCARREG HOUSE. c.26.6m



- R3 - 2. WHITEWELL COTTAGES. BONVILSTON. c.48.9m
- R5 - 1. WHITEWELL COTTAGES. BONVILSTON. c.53.7m
- R6 - TYN Y COED FARM. BONVILSTON. c.71.4m
- R10 - TY NANT BUNGALOW. BONVILSTON. c.160.5m
- R14 - GREENDOWN. BONVILSTON. c.182.7m
- R16 - BLACKLAND FARM. c.198.2m
- R17 – CHERRY TREE COTTAGE ANNEXE. BROOKLANDS. BROOK LANE. ST NICHOLAS. c.202.5m
- R18 - BROOKLANDS. BROOK LANE. ST NICHOLAS. c.202.5m
- R21 - THE PADDOCKS. BONVILSTON. c.219.2m
- R22 - TIRNANT. BROOK LANE. ST NICHOLAS. c.223.4m
- R23 - WILD MEADOW COTTAGE. BONVILSTON. c.231.3m
- R24 - THE CWM. BROOK LANE. ST NICHOLAS. c.247.5m
- R25 - ASH TREE HOUSE. BONVILSTON. c.313.4m
- R26 - REDLANDS COURT FARM. BONVILSTON. c.331.2m
- R29 - REDLANDS HOUSE. BONVILSTON. c.363.0m
- R32 - 2. TREHILL COTTAGES. ST NICHOLAS. c.514.3m / 461.2m (garden)
- R35 - THE CHASE. BROOK LANE. ST NICHOLAS. c. 534.6m / 495.5m (garden)

7.10.4 Settlements within 2.5km:

- Bonvilston c750m north of DA 1
- St Nicholas c.560 north east of DA 2 and 1.15km northeast of DA 1
- Dyffryn c 1.3km south east of DA 2

**Table 7.5: Assessment of Visual Effect on Residential Properties - Summary Table**

Receptor (distance to closest area of site boundary)	Magnitude of Visual Effect	Level of Visual Effect (SIGNIFICANCE)	Level of Visual Effects (SIGNIFICANCE) longer term, c. 10 years, after establishment of mitigation (where applicable)
0.5 R1 - PENCARREG HOUSE. c.26.6m	Medium	Major-Moderate (Not Significant)	Moderate (Not Significant)
0.6 R3 - 2. WHITEWELL	Medium	Major-Moderate (Not Significant)	Moderate (Not Significant)

Receptor (distance to closest area of site boundary)	Magnitude of Visual Effect	Level of Visual Effect (SIGNIFICANCE)	Level of Visual Effects (SIGNIFICANCE) longer term, c. 10 years, after establishment of mitigation (where applicable)
COTTAGES. BONVILSTON. c.48.9m			
0.7 R5 - 1. WHITEWELL COTTAGES. BONVILSTON. c.53.7m	Medium	Major-Moderate (Not Significant)	Moderate (Not Significant)
0.8 R6 - TYN Y COED FARM. BONVILSTON. c.71.4m	Low	Moderate (Not Significant)	Moderate-Minor (Not Significant)
0.9 R10 - TY NANT BUNGALOW. BONVILSTON. c.160.5m	Negligible	Neutral (Not Significant)	Neutral (Not Significant)
0.10 R14 - GREENDOWN. BONVILSTON. c.182.7m	Negligible	Neutral (Not Significant)	Neutral (Not Significant)
0.11 R16 - BLACKLAND FARM. c.198.2m	Negligible	Neutral (Not Significant)	Neutral (Not Significant)
0.12 R17 – CHERRY TREE COTTAGE ANNEXE. BROOKLANDS. BROOK LANE. ST NICHOLAS. c.202.5m	Low	Moderate (Not Significant)	Moderate (Not Significant)
0.13 R18 - BROOKLANDS. BROOK LANE. ST NICHOLAS. c.202.5m	Low	Moderate (Not Significant)	Moderate (Not Significant)
0.14 R21 - THE PADDOCKS. BONVILSTON.	Negligible	Neutral (Not Significant)	Neutral (Not Significant)

Receptor (distance to closest area of site boundary)	Magnitude of Visual Effect	Level of Visual Effect (SIGNIFICANCE)	Level of Visual Effects (SIGNIFICANCE) longer term, c. 10 years, after establishment of mitigation (where applicable)
c.219.2m			
0.15 R22 - TIRNANT. BROOK LANE. ST NICHOLAS. c.223.4m	Low	Moderate (Not Significant)	Moderate (Not Significant)
0.16 R23 - WILD MEADOW COTTAGE. BONVILSTON. c.231.3m	Negligible	Neutral (Not Significant)	Neutral (Not Significant)
0.17 R24 - THE CWM. BROOK LANE. ST NICHOLAS. c.247.5m	Low - Negligible	Moderate-Minor (Not Significant)	Moderate-Minor (Not Significant)
0.18 R25 - ASH TREE HOUSE. BONVILSTON. c.313.4m	Low	Moderate (Not Significant)	Moderate-Minor (Not Significant)
0.19 R26 - REDLANDS COURT FARM. BONVILSTON. c.331.2m	Low - Negligible	Moderate-Minor (Not Significant)	Minor (Not Significant)
0.20 R29 - REDLANDS HOUSE. BONVILSTON. c.363.0m	Negligible	Neutral (Not Significant)	Neutral (Not Significant)
0.21 R32 - 2. TREHILL COTTAGES. ST NICHOLAS. c.514.3m / 461.2m (garden)	Negligible	Neutral (Not Significant)	Neutral (Not Significant)
0.22 R35 - THE CHASE. BROOK LANE.	Negligible	Neutral (Not Significant)	Neutral (Not Significant)

Receptor (distance to closest area of site boundary)	Magnitude of Visual Effect	Level of Visual Effect (SIGNIFICANCE)	Level of Visual Effects (SIGNIFICANCE) longer term, c. 10 years, after establishment of mitigation (where applicable)
ST NICHOLAS. c. 534.6m / 495.5m (garden)			
D.23 Bonvilston c750m north of DA 1	Negligible	Neutral (Not Significant)	Neutral (Not Significant)
D.24 St Nicholas c.560m north east of DA 2 and 1.15km north east of DA 1	Negligible	Neutral (Not Significant)	Neutral (Not Significant)
D.25 Dyffryn c 1.3km south east of DA 2	Negligible	Neutral (Not Significant)	Neutral (Not Significant)

7.10.26 In summary, the main residential visual receptors within c.500m of the site have been assessed. The visual assessment established that no residential receptors would experience effects of a 'Significant' nature. The greatest levels of visibility are predicted from three main areas:

- Upper Llancarfen Valley receptors to the west of DA1; R1, R3 and R5;
- The Redlands Farm grouping to the north of DA 1 and DA 2; R25 and R26 and;
- Brook Lane properties to the east of DA 2; DA17, DA18, DA22 and DA24.

7.10.27 Within the upper Llancarfen valley area the three receptors are considered to experience Major-Moderate, but Not Significant visual effects at scheme opening, reducing to moderate effects following the establishment of mitigation. Views will be the most extensive from the semi-detached properties R3 and R5. The semi's front the local lane (unnamed) with an area of mature trees, beyond which a mature tall hedgerow borders the site area. Although the properties front the site boundary, the closest area of the site is to be left over as a grass pasture field, so the closest area of arrays are set c.90m to the east of the properties, beyond a new mitigation hedgerow. The arrays are at a ground level of c.51m to 58m aod, the 2 storey properties at a ground level of c.49m aod. Review of views out from the site area confirms that there would be channelled visibility from the 1st floor front windows through a gap in the near tree cover to the western edges of the site. Views over the majority of DA 1 would be screened by woodland and landform variations. No potential for visibility to DA 2 or DA 3.

7.10.28 Within the Redlands Farm grouping (which includes the DA 2 Redlands landowners home, not assessed) views are most extensive from R25, the property is considered to experience Moderate, Not Significant, visual effects at scheme opening reducing to Moderate-Minor following the establishment of mitigation. The two storey property has open views to the south from the rear elevation in the general direction of DA 2 and DA 1, particularly from 1st floor windows. The property at an elevation of c.105m aod, the closest areas of DA 2 at c.90m aod, the nearest arrays with DA 2 at a distance of c.420m. There are likely to be limited views to the northern areas of DA 2 only, but at a distance of greater than 420m, ground levels gently drop limiting distant visibility. The intervening area, and northern site boundary also contains a number of mature hedge trees and fragmented hedgerows which will also filter visibility further.

7.10.29 With regard to the Brook Lane grouping to the east of DA 2, effects are at the greatest considered to be Moderate and Not Significant, remaining at these levels post establishment of mitigation. The properties have restricted visibility from a slightly elevated location into the south eastern and central areas of DA 2, although views are substantially restricted by near and intermediate vegetation, notable around the small scale field structures of the upper valley area and site boundary. It is considered that the visible areas of the site would be >300m from the properties, the change in texture and colour of field coverage, looking down on the site, the notable feature. No change to long distance views. No visibility to western areas of DA 2 or any area of DA 1 or DA 3.

#### Assessment of Predicted Visual Effect on Recreational Routes within 250m

7.10.30 As discussed in the baseline section, there is an extensive network of footpaths and trails within the study area, many are continuous routes however the different sections are named independently within the baseline section and illustrated on Figure 7.15 (to a 500m study area). Detailed assessment tables are included with **Appendix 7.5** (Doc Ref. 4.01.7e), summarised in the below table.

**Table 7.6: Assessment of Visual Effect on Recreational Routes and Transportation Network - Summary Table**

Receptor (distance to closest area of site boundary)	Magnitude of Visual Effect	Level of Visual Effect (SIGNIFICANCE)	Level of Visual Effects (SIGNIFICANCE) longer term, c. 10 years, after establishment of mitigation (where applicable)
PROW VG L5 28/3 Abernant farm to White Wells	Medium	Moderate-Major (Not Significant)	Moderate (Not Significant)
PROW VG L5 28/4	Low	Moderate (Not Significant)	Moderate-Minor (Not Significant)
PROW VG L5 28/2 White Wells to Leach Castle Farm	Medium	Moderate-Major (Not Significant)	Moderate (Not Significant)

Receptor (distance to closest area of site boundary)	Magnitude of Visual Effect	Level of Visual Effect (SIGNIFICANCE)	Level of Visual Effects (SIGNIFICANCE) longer term, c. 10 years, after establishment of mitigation (where applicable)
PROW Group VG L5 29/2, VG B2 13/1 and VG B2 14/1 Liege Manor to A48	Negligible-Low	Minor (Not Significant)	Minor-Neutral (Not Significant)
PROW Group VG/B2 15, 16,17,18 and 19 Ty'n-y-coed to Bonvilston	Medium-High	Moderate-Major (Not Significant)	Moderate (Not Significant)
PROW Group VG S11 9/1 A4226 to A48 St Nicholas	Medium	Moderate (Not Significant)	Moderate-Minor (Not Significant)
PROW Group VG S11 8/1, VG S11 8/2 and VG S11 7/1 A48 St Nicholas to Tinkinswood	Medium-Low	Moderate (Not Significant)	Moderate (Not Significant)
PROW Group VG S11 7/2, VG/S11/7/3 and VG/S11/13/1 Tinkinswood to Dyffryn. The 'Valeways Millennium Heritage Trail' regional route.	Medium-Low	Moderate (Not Significant)	Moderate (Not Significant)
Transportation Network			
A4226 Between DA 1 and DA 2	Medium-Low	Moderate-Minor (Not Significant)	Minor (Not Significant)
A48 north of DA 1 and DA 2	Negligible	Minor-Neutral (Not Significant)	Minor-Neutral (Not Significant)
Un named road west of DA 1 Pancross (c.900m west)	Negligible	Minor-Neutral (Not Significant)	Minor-Neutral (Not Significant)
Un named road beside DA 1 western boundary	Low	Minor (Not Significant)	Minor-Neutral (Not Significant)

7.10.31 In summary, no public rights of way are concluded to experience visual effects of 'significant' nature when visibility upon the whole route lengths is considered. It is noted that some of the assessed viewpoints are located upon the PROW in the study area, these consider the sections of the routes with the most open visibility to the site area, visual effects are considered separately at these points.

7.10.32 Although no Public Rights Of Way cross the site areas, there are a number <200m that would have partial visibility towards the site area, the routes with at least a 'Medium' magnitude of change include:

- PROW VG|L5|28/3 Abernant Farm to White Wells, a near footpath within the upper Llancarfen Valley area, views possible to the far western areas of DA 1 only when walking towards the road corridor, views filtered by mature site hedgerow, and longer term by proposed mitigation and management measures. Viewpoint 4 illustrates a location with the most open visibility from this local area. Effects are considered to be '**Moderate-Major**' but 'Not Significant' overall at scheme opening.
- PROW VG|L5|28/2 White Wells to Leach Castle Farm, a footpath within the upper Llancarfen valley to the west of DA 1, c.120m from the western site boundary, although c.160m from the closet arrays. Visibility from the short section of footpath close to ref 28/3 on approach only. Visibility to the western edge of DA 1 only, local views along the route are restricted by the small scale field structure; mature remnant hedgerows and large hedge trees, which combine to enclose the local area. Views longer term filtered by proposed management and mitigation measures. Viewpoint 4 illustrates a location with the most open visibility from this local area. Effects are considered to be '**Moderate-Major**' but 'Not Significant' overall at scheme opening.
- PROW Group VG/B2 15, 16,17,18 and 19 Ty'n-y-coed to Bonvilston, c.170m to the north of DA 1 where it runs parallel with the site. For the routes as a whole as one moves towards Bonvilston, (represented by Viewpoint 6) (and the Llancarfen Valley, the visibility into the site reduces with further intermediate screening from hedgerows and field boundary treelines so that views into DA 1 are partial. Moving away from the few areas with visibility, covered by the viewpoints, overall, the scale of change reduces and whilst the changes would be still clearly noticeable and still an important new element the arrays would substantially alter the composition of the views experienced. Viewpoint 5 taken from the footpath VG|B2|13/1 where it runs parallel and close to the site provides the most open visibility found for the series of linked routes between Bonvilston and the upper Llancarfen valley area. Effects are considered to be '**Moderate-Major**' but 'Not Significant' overall at scheme opening.
- PROW Group VG|S11|9/1 A4226 to A48 St Nicholas, a footpath between Five Mile Lane and the west edge of St Nicholas which offers visibility into Redlands DA 2, which is also represented by Viewpoint 3 at the most open area. Excluding this area, covered by the viewpoint assessment, the majority of the route would have screened / heavily filtered views to DA 2, seen at a distance >250m. Views are limited by the mature field structure of DA 2 and the mitigation and management proposals upon the northern boundary of DA 2. Effects are considered to be '**Moderate-Major**' but 'Not Significant' overall at scheme opening.

7.10.33 Visual effects upon the main transportation corridors within the study area are focussed to the A4226 as it passes between DA 1 and DA2 and a local unnamed lane within

Llancarfen Valley, which adjoins the western boundary of DA 1. Despite the close distance, visibility is substantially restricted by mature roadside vegetation, and a low duration of effects. Not significant visual effects are concluded for all the road corridors. The viewpoint assessment focussed on the most visible locations, i.e. stationary views from open field gates, so not wholly representative of views experienced by travellers upon the local roads.

#### Assessment of Predicted Visual Effect on Construction and Decommissioning Phases

7.10.34 Construction activities which have the potential to temporarily affect the views and visual amenity of receptors include:

- Frequency of deliveries to site and vehicle movements on and off site;
- Effects upon local views to the site to the installation of site infrastructure - fencing with CCTV, solar arrays, switchgear, substation and inverters. Visible construction operations / machinery; and
- Views of the temporary construction compound (welfare and construction equipment) and reinstatement works to areas disturbed by construction activities.

7.10.35 De-commissioning activities which have the potential to affect the views and visual amenity of receptors include:

- Dismantling and removal of all installed infrastructure resulting in increased vehicle movements on and off site;
- Effects upon local views to the site through the visible activity of construction operations (machines and movement); and
- Short term views to areas disturbed by de-commissioning activities and time period for reinstatement works to establish.

7.10.36 From the description of the construction and de-commissioning activities as outlined above, any effects on views and visual receptors during the construction and de-commissioning phases will be temporary and short term in duration.

7.10.37 Any damaged fields as a result of de-commissioning activities will be re-seeded with a locally appropriate grassland mix, all landscape mitigation will remain so the level of visual containment of the sites will be unaffected. It is therefore considered that the short-term, reversible, and temporary nature of the construction and de-commissioning activities on views and visual receptors will ensure that the overall effects will be, at worst, Minor. These are considered to be experienced by a small number of people and form small features in the overall view. The effects would be short term and temporary and overall considered to be of a 'Not Significant' nature.

#### Assessment of Predicted Visual Effect on Viewpoints

7.10.38 Visual receptor sensitivity to change is defined as being High, Medium, Low or Negligible depending upon the activity of the receptor. For further information in relation to sensitivity see the Methodology in **Appendix 7.5** (Doc Ref. 4.01.7e). The location of the viewpoints is illustrated on **Figure 7.16**.



7.10.39 To assist in the description and comparison of the effects on views, issues to be considered include:

- The nature of the view of the development e.g. full, partial, glimpse.
- The proportion of the development or features that would be visible e.g. full, most, small, part, none.
- The distance of the viewpoint from the development and whether the viewer would focus on the development due to its scale and proximity or whether the development would be only a small, minor element in a panoramic view.
- Whether the view is stationary or transient or one of a sequence of views, as from a footpath or moving vehicle; and,
- The nature of the changes e.g. changes in the skyline profile, a new visual focus, changes in visual simplicity or complexity and alteration of visual scale.

7.10.40 The existing level of visibility from the viewpoints is illustrated as a baseline photograph on the viewpoint sheets. Detailed analysis of the viewpoints is made with reference to the current baseline views and then assessed against the photomontage or annotated site extents (where appropriate). The viewpoint assessment considers the existing visible local features, e.g. trees and built structures and the proposed mitigation vegetation at scheme opening, considered to be the time of greatest visibility to the development. Further comment is made regarding ~10 years from planting to take account of the screening and enhancement potential of the existing vegetation and proposed mitigation.

7.10.41 Detailed analysis of the viewpoints is made with reference to the current baseline views (Section 7.6). The analysis of the magnitude of change, and the resulting visual effect, are summarised in the following table, detailed assessment tables are contained within **Appendix 7.5** (Doc Ref. 4.01.7e).

**Table 7.7: Assessment of Visual Effect on Viewpoints - Summary Table**

Receptor (distance to closest area of site boundary)	Magnitude of Visual Effect	Level of Visual Effect (SIGNIFICANCE)	Level of Visual Effects (SIGNIFICANCE) longer term, c. 10 years, after establishment of mitigation (where applicable)
VP1 Development Area 1 entrance, 'Pancross', Five Mile Lane / A4226	Medium -Low	Moderate -- a 'Not Significant' visual effect	Minor -- a 'Not Significant' visual effect
VP 2 Development Area 2 entrance, 'Redlands', Five Mile Lane / A4226	Medium	Moderate -- a 'Not Significant' visual effect	Minor -- a 'Not Significant' visual effect
VP3 Public Footpath to the SE of Redlands Farm	Medium	Moderate-Major - – a 'Not Significant' visual effect	Moderate-Minor - – a 'Not Significant' visual effect
VP4 Farm Public Footpath close to Whitewell Cottages, Llancarfen Valley	Medium	Moderate-Major - a 'Not Significant' visual effect	Moderate - a 'Not Significant' visual effect
VP5 Public Footpath (VGB2 17/1) to the north of DA 1 Pancross	High	Major - a 'Significant' visual effect	Moderate-Major - a 'Not Significant' visual effect
VP6 Public Footpath (VGB2 19/1) to the north of DA 1 Pancross	Medium-High	Moderate-Major - a 'Significant' visual effect	Moderate-Major - a 'Not Significant' visual effect
VP7 Public Footpath VG S11 8/1 to the northeast of DA 2 Redlands	Medium	Moderate - a 'Not Significant' visual effect	Moderate - a 'Not Significant' visual effect
VP8 A4226, Five Miles Lane to the south of DA 1 and DA 2	Negligible	Minor- a 'Not Significant' visual effect	Minor- a 'Not Significant' visual effect
VP9 Valeways Millennium Heritage Trail PROW VG S11 7/3, Near Tinkinswood Burial Chamber	Medium	Moderate-Major - – a 'Not Significant' visual effect	Moderate-Major - a 'Not Significant' visual effect

Receptor (distance to closest area of site boundary)	Magnitude of Visual Effect	Level of Visual Effect (SIGNIFICANCE)	Level of Visual Effects (SIGNIFICANCE) longer term, c. 10 years, after establishment of mitigation (where applicable)
VP10 Dyffryn (Car Park) Registered Park and Garden	None	No Change - Neutral – a ‘Not Significant’ visual effect	No Change - Neutral – a ‘Not Significant’ visual effect
VP11 Whitton Mawr close to A4226	None	No Change - Neutral – a ‘Not Significant’ visual effect	No Change - Neutral – a ‘Not Significant’ visual effect
VP12 A4226, close to Redland Farm grouping	Low	Minor- a ‘Not Significant’ visual effect	No Change - Neutral – a ‘Not Significant’ visual effect
VP13 West Llancarfan, (Unanamed) road verge north of Caemaen Farm	None	No Change - Neutral – a ‘Not Significant’ visual effect	No Change - Neutral – a ‘Not Significant’ visual effect
VP14 PROW VG L15 5/1, west of Llantrithyd Place RPG	None	No Change - Neutral – a ‘Not Significant’ visual effect	No Change - Neutral – a ‘Not Significant’ visual effect
VP15 PROW VG W2 62/4 St Lythans Down	None	No Change - Neutral – a ‘Not Significant’ visual effect	No Change - Neutral – a ‘Not Significant’ visual effect
VP16 North of Llancarfan	Medium-Low	Moderate – a ‘Not Significant’ visual effect	Moderate- a ‘Not Significant’ visual effect
VP17 Lillypot (north of Bonvilston)	Medium -Low	Moderate – a ‘Not Significant’ visual effect	Moderate – a ‘Not Significant’ visual effect

7.10.42 The viewpoint assessment considered an extensive range of publicly accessible locations to illustrate the greatest (and representative) levels of visibility to the 3 solar Development Areas within the study area. All locations were agreed in consultation with Vale of Glamorgan County Borough Council. 17 no. viewpoint locations have been assessed, the viewpoints considered close range views to the DAs and also the potential visibility of multiple DAs distributed within the study area. A single viewpoint was considered to experience visual effects of a ‘significant’ nature (VP 5).

7.10.43 Viewpoint 5 visual effects are ‘significant’. The slightly elevated (in relation to the site) close range viewpoint is located in the field c.300m from the northern site boundary in the small-scale pastures between the sites and A48 road corridor (Bonvilston). This offers open views over the site and as expected provides an extensive view of the solar

arrays primarily within DA 1 Pancross. The viewpoint is representative of users of the public right of way between Bonvilston and the upper Llancafren Valley areas & Whitewell. It is however noted that the viewpoint location represents the most open and visible location upon this section of the footpath with views along the route often offered partial screening from field boundaries especially when not directly above the site as is the case here.

7.10.44 This point is illustrated further by the nature of the view experienced at Viewpoint 6 when a large proportion of the site (entire east side of DA 1) is screened and views of the deployment whilst channelled towards the site become more recessive with arrays seen as a thin band of lighter contrasting colour to that of adjoining fields. So, whilst still noticeable and a Moderate-Major level of effect, the increased distance from the arrays reduces the overall magnitude of change when close to the settlement edge as at VP6 (Bonvilston), and so the overall character and composition of the view remains with the solar arrays appearing well assimilated to the existing field systems and woodland structure. It also worth stating that nearby residents to the north of these viewpoints within the A48 road corridor, which is afforded a further level of screening from roadside trees and hedgerow would also experience views that are of a 'Not Significant' nature. (Refer to Residential Viewpoint Assessment at section 7.10.)

7.10.45 The remaining viewpoints, despite some locations offering visibility to the Development Areas which for some (mostly close range locations) would experience up to Moderate and Moderate-Major level of effect, these were all considered to be of a 'Not Significant' nature. The level of significance also takes account of the nature of the changes, the extent of visibility experienced, sensitivity of the receptor and how substantial the change would be in relation to the character and composition of the existing view. These are effects that although considered to be noticeable in many instances, would not be dominating when the development is viewed within the overall visual environment. These would be effects that would not be material in the planning decision making process.

## 7.11 CUMULATIVE ASSESSMENT

7.11.1 Opportunities exist for potential cumulative views, where more than one solar farm, including the proposed development, may be seen either simultaneously or sequentially. Solar farms with the potential to generate cumulative effects include those which; are constructed, are in construction; have planning permission and are not yet constructed; or are awaiting determination of planning permission.

7.11.2 Developments that are subject to a valid planning application are included where specific circumstances indicate there is potential for cumulative effects to occur, with progressively decreasing emphasis placed on those which are less certain to proceed.

7.11.3 Operational, and consented developments are treated as being part of the landscape and visual baseline. i.e. it is assumed that consented schemes will be built except for occasional exceptions where there is good reason to assume that they will not be constructed. Review of the local study area has confirmed that all consented schemes are now operational.

7.11.4 The cumulative assessment, which focusses on the combined and sequential effects of the Proposed Development with the developments identified. Figure 7.17 illustrates the cumulative solar schemes within the study area:

- 1) Land Least of Five Mile Lane, Whitton Mawr Ref: 2014/00798/FUL. Operational (not considered as part of the cumulative assessment, a baseline landscape feature, discussed where applicable in main assessment) c.375m to the south of DA 2, closest point;
- 2) **Land at Vianshill Farm, Grants Field, The Downs, St Nicholas (Parc Dyffryn) Ref: 2021/00110/OBS. C.770m east of DA 2, closest point;**
- 3) Land at the Garn, St. Hilary Ref: 2012/01224/FUL. Operational (not considered as part of the cumulative assessment, a baseline landscape feature, discussed where applicable in main assessment) c.2.48km north west of DA 1;
- 4) Land adjacent to Sutton Mawr Farm, Barry Ref: 2013/00617/FUL. Operational (not considered as part of the cumulative assessment, a baseline landscape feature) c.2.2km south of DA 3, closest point.;
- 5) **Home Farm, Dyffryn Ref: 2015/01378/SC1. C.1.6km south east of DA 2, closest point; and**
- 6) **Land at Moulton, Barry (2 site areas) 2020/00708/SC1. C.1.58km south of DA 3, closest point.**

#### Cumulative Effects

- 7.11.5 Cumulative effects are assessed on the same groups of landscape and visual receptors as the assessment for the main scheme. Landscape and visual receptors that are considered to receive effects of Low or Negligible magnitude from the proposed development are not included in this assessment.
- 7.11.6 Consideration has also been given to potential cumulative influences from other environmental topics assessed as part of this EIA and from significant and non-solar proposals beyond the application site boundary. Details of such schemes are listed in Chapter 13 of this ES.
- 7.11.7 Two schemes, Ref 5 and Ref 6 (which are currently at screening stage) are located within the outer zone of the study area, the ZTV illustrates that there would be no potential for intervisibility between the two site areas, it is therefore considered that due to the separation distances and intervening screening features, cumulative visual effects as a result of these two schemes would be negligible. Not significant cumulative visual effects are concluded for both of these schemes. Both of these schemes are located within the same host landscape character areas as Oaklands, LCA 16 and 22. Due to the separation distances and consideration of intervening landscape features; notably large woodland blocks, operational site Ref 1 and the Dyffryn Gardens area it is considered that there is very limited potential for direct cumulative landscape effects, a minor adverse level, Not Significant upon landscape receptors.
- 7.11.8 With regard to the cumulative effects as a result of the Ref 2 scheme (not consented, currently at the determination stage) analysis of the ZTVs of both schemes indicates that there is the potential for intervisibility between the eastern areas of Oaklands, focused to the DA 2 area only. Visibility is also shown over DA 3, Oaklands, however site survey confirmed that this area is enclosed with limited visibility out over the wider landscape. Intervisibility between DA 2 and Ref 2 is expected as Ref 2, c.1.6km to the east, is located upon a higher localised ridge area on the fringes of the study area, as

demonstrated by the large telecommunications mast which is located close to the site of Ref 2.

- 7.11.9 Viewpoint 15 illustrated the scale of the Oaklands site when viewed from the area of Ref 2, and as discussed no cumulative visual effects were concluded. The limited receptors to the east of DA 2, close to Brook Lane and the Valeways Millennium Heritage Trail, may have potential visibility to both schemes however they would not be visible in the same viewing arch, DA 2 partially visible to the west and Ref 2 potentially visible to the east, combined visibility in succession. Due to the separation distances and the predicted scale of the sites, cumulative visual effects from these receptors are predicted to be no more than Moderate/Minor Adverse and Not Significant of a sequential level when moving through the landscape, and potentially only in a 360° arc from fixed receptors. A discernible, but not obvious additional change, in conjunction with other developments, to the view.
- 7.11.10 DA 2 and Ref 2 are located within different LCA areas, LCA 22 and LCA 23 respectively and predominantly in different Landmap Visual Sensory Aspect Areas (although there is a small area of overlap). Due to the separation distances and location of the sites in different LCA areas it is concluded that there would be no direct cumulative landscape effects as a result of Oaklands and the Ref 2 scheme. There is the potential for indirect landscape effects upon the intermediate area between both sites although due to the levels of intervisibility and localised landscape features cumulative landscape effects are predicted to be no more than a Minor Adverse level and Not Significant, a slight additional change, in conjunction with other developments, to landscape character.
- 7.11.11 It is further considered that during construction and decommissioning phases, which would most likely be at different times, the potential for cumulative landscape and visual effects would be less than the previously discussed operational stages. Not Significant cumulative landscape and visual effects are concluded.
- 7.11.12 Overall cumulative landscape and visual effects are only noted as a result of the additional Ref 2 (Parc Dyffryn Solar, Viانشill) scheme with the host Oaklands. Effects are concluded to result in cumulative effects of a Not Significant nature. Visual effects would (at the most adverse) be discernible in the view and limited to 'combined - in succession' views in very limited areas between both schemes. Landscape effects would be indirect, focussed to the c.1.6km wide zone between both schemes, a heavily wooded and undulating area. Cumulative landscape effects are concluded to result in a slight additional change, in conjunction with Ref 2, to landscape character.

## 7.12 SUMMARY AND CONCLUSIONS

### Landscape Assessment

- 7.12.1 With regard to landscape value, the assessment has concluded that the DAs were of a 'Medium' value combined based on the criteria within the methodology.
- 7.12.2 The DAs are noted for their contribution towards landscape condition (intact field systems), scenic quality (quieter areas away from transport corridors and settlements) historic and conservation interests (cultural and ecological features). These are all features considered to be predominantly unaffected by this form of solar development. The DAs also contain commonplace landscape features that are seen throughout the host LCAs and the sites themselves do not provide direct recreational value / public

access. Landscape perceptions are also influenced by the nearby busy transport corridors and overhead electricity pylon line running east/west across the sites and adjacent valley slopes.

- 7.12.3 The published landscape character assessments for The Vale of Glamorgan 'Landscapes Working for the Vale of Glamorgan' (1999), was reviewed as part of the baseline assessment, and key points have been highlighted. The DAs are within 2 different landscape character areas although the majority of the deployment areas lie within the least sensitive of the two (moderate visual evaluation) LCA 16 Central Slopes and Valleys which is described as:

*'well-kept farmland and substantial woodland blocks with scattered settlements of farmhouses and historic settlements. Long views of coast possible'. The area has a 'moderate' visual evaluation."*

- 7.12.4 The eastern half of DA 2, Redlands, is located within the more visually sensitive (high visual evaluation) LCA22: Dyffryn Area which is described as:

*'Broad gentle sloping valley running from limestone ridge south towards lower Waycock reaches and overlooked by northern edge of Barry. Arable and pastoral farmland with trimmed hedges, blocks of woodland, scattered settlement focussed on Dyffryn village. Dyffryn Gardens is a local attraction. The area has high value particularly attached to visual and cultural aspects, but also to historical. The area has a 'high' visual evaluation.*

- 7.12.5 The LCA makes no commentary on the sensitivity of the LCA's to development typologies but with reference to the landscape value and local landscape character informed by the LANDMAP assessments it is considered that the stated sensitivity of the site areas generally followed that of the relevant aspect areas covering the site and its immediate context. The overall sensitivity of the 3 DA's is considered to be Moderate to the solar and battery storage development.

- 7.12.6 With regard to landscape receptors, the study area is contains 4 Special Landscape Areas of which 2 cover the site and its immediate context which it was considered had potential to be adversely affected by the development.

- 7.12.7 The west side of the study area to the south of the A48 corridor is covered by Nant Llancarfan SLA. The Vale of Glamorgan County Borough Council produced a report on the designation of Special Landscape Areas in 2008. It states the following with regards to SLA 4 Nant Llancarfan:

*"Aspect area identified High and Outstanding evaluations associated with the Nant Llancarfan Valley. The narrow and enclosed Waycock Valley, with many villages designated as Conservation Areas, occupies the southern region of this SLA. The eastern boundary along the A4226 abuts the Dyffryn Basin and Ridge Slopes SLA."*

- 7.12.8 The east half of the study area to the east of the A4226 and south of the A48 road corridors is described as follows:

*'Broad gentle sloping valley running from limestone ridge south towards lower Waycock reaches and overlooked by northern edge of Barry. Arable and pastoral farmland with trimmed hedges, blocks of woodland, scattered settlement focussed on Dyffryn village. Dyffryn Gardens are a local attraction. The area has high value particularly attached to visual and*

*cultural aspects, but also to historical. The issue of highly visible encroachment of development onto the steep slopes north of Barry needs to be addressed. Power lines are also a detractor in southern part of valley.'*

- 7.12.9 Whilst the development would have an impact on the characteristics of the SLA's, it was concluded that due to the limited vertical scale of the solar arrays and the rolling farmland landscape, with hedgerow field boundaries and woodland blocks to adjoining slopes and valleys, the effects on the SLA are concentrated to the site and its immediate setting and defined areas of intervisibility. It is also the case that the more sensitive and characteristic features of the SLA's are located in distinct areas to the south, south west and south east in the Nant Valley and around the settlements of Llancarfan and Dyffryn, characterised by more intimate small scale pastures interspersed by woodland which together with local ridges and valley topography separates them from the site development areas.
- 7.12.10 It is considered that the landscape effects upon the setting of the SLA, as a result of the development would be **Moderate at Year 1** reducing to **Minor at Year 10** (following successful establishment of mitigation hedgerows and tree planting) which are 'Not Significant' Landscape effects.
- 7.12.11 The designated area for the Registered Historic Landscape of Llancarfan (HLW (SG) 1) covers the far west side of the deployment at DA 1 Pancross (only). The ZTV established and provided further verification that the development areas only occupy a small part of the HLA inclusive of the western part of DA 1 Pancross. The Archaeological Desk Based Assessment stated: 'The overall potential impact on Llancarfan (HLW (SG) 1) will be 'Moderate'.
- 7.12.12 As effects on historic features would be localised and likely to be of a lower level than that which could potentially occur and that the historic field systems outside of the site would not be adversely affected it is considered that the landscape effects upon the setting of Llancarfan HLA, as a result the development would be **Minor (in landscape terms)– a 'Not Significant'** Landscape effect.
- 7.12.13 Dyffryn Registered Park and Gardens (RPG) is located to the south east (c.600m +). The site and setting of the RPG has no intervisibility to the DA's and so as a result of the development there would *be No change* and a **Neutral** level of effect which is a 'Not Significant' effect.
- 7.12.14 Analysis of the published landscape character assessment and LANDMAP Visual Sensory data, considered with the particular characteristics of the study area, has concluded that there would be no significant effects upon landscape character and LANDMAP areas as a result of the development. Due to the scale of the areas, the form of development and local context (vegetation, built form and topographic elements) the schemes will have a limited adverse impact on characteristic elements, notably affecting the pastoral landscape pattern. Despite being considered a Moderate level of effect (at the most adverse) these are effects that are geographically restricted within the expansive landscape character / visual sensory areas.
- 7.12.15 The susceptibility to change of the landscape to the solar farm development, within the three DAs, considered the ability of the landscape to accommodate the specific proposed development. Due to the scale of the proposed solar farm development



(vertical and overall surface area) within the three DAs, local landscape features (gently rolling and undulating landform surrounded by woodland blocks and mature hedgerows), the susceptibility to change of the pastoral landscape is considered to be **Medium**. It is accepted that there would be some undue consequences as a result of development, but that the landscape receptor has some capacity to accept change due to the development form and scale.

7.12.16 The development would lead to a loss of arable grassland and pastoral grazing land at the local level, although the grazing can still continue at a lower intensity. It is also considered that due to the local levels of enclosure from woodland and intermediate ridges and valley side slopes, that the local landscape and immediate surroundings could accommodate this particular form of development without a significant change in local character outside of the site boundaries. The development areas contain commonplace landscape characteristics that would not be overly vulnerable to the proposal.

7.12.17 The value of the landscape receptor, three solar DAs, which consist of a range of pastoral fields, is considered with regard the baseline landscape value conclusions. The DAs and surrounding areas (<5000m) are subject to regional level landscape designations (SLA and part of DA1 is an historic landscape area) and so do contain some sensitive elements cited in the referenced landscape character, LANDMAP and sensitivity assessments.

7.12.18 The DAs are noted for their individual scenic quality (quieter areas away from transport corridors and settlement edges) although are not publicly accessible, providing no recreational value. When visible, or close to the development areas, landscape perceptions are also influenced by the local detractors including; the near transport corridors and overhead electricity pylons.

7.12.19 It is acknowledged that the visual aesthetic (character) locally of the DAs will change however, the retention and management of surrounding vegetation (acknowledged to be one of the key landscape characteristics) and proposed mitigation will lessen the visual prominence of the solar tables within the DA's, aiding landscape integration over time.

7.12.20 In accordance with the LVIA methodology (Appendix 7.1), a **Medium** landscape value judgement can be explained as *“Medium importance and rarity, limited potential for substation...Lies wholly or partially within a designated landscape (SLA / historic landscape area) but where localised character and scenic value is less distinctive or has become degraded. Presents locally distinctive landscape characteristics with some scenic interest. Presents some public amenity by way of views, access biodiversity, cultural or opportunity for quiet enjoyment (relative tranquillity)”*.

7.12.21 Magnitude is considered with regard to the scale, geographical extent, and duration and reversibility of landscape effects, as set out in the methodology. The magnitude of landscape change arising from the proposed development is considered to be **Medium**. In accordance with the methodology this is a

*“Partial loss to landscape elements of the baseline and introduction of elements that may be prominent but not necessarily substantially uncharacteristic with the attributes of the receiving landscape but which could co-characterise parts of the landscape”*.

7.12.22 The significance of landscape effect of the solar DAs upon local area is determined by consideration of the landscape sensitivity and magnitude of landscape effect. A 'Moderate' significance of landscape effect is concluded overall, this is a 'Not Significant' effect. Although not significant effects are stated, adverse landscape effects are acknowledged and the moderate effects are still of a level to form an important consideration (although not in itself material) in the overall planning decision making process. The solar farm proposal over the three DAs by nature of its scale would, at a localised level, markedly change a Medium value / susceptibility to change landscape, diminish the sense of place and adversely impact characteristic features (focused on the pastoral and arable grassland within the established structure).

7.12.23 With regard to the construction and de-commissioning activities, any effects on landscape character and landscape receptors during the construction and de-commissioning phases will be temporary and short term in duration. There would be no direct changes to the landscape immediately outside of the site boundaries (no additional requirements for space), as the construction and decommissioning operations retained within.

7.12.24 It is therefore considered that the short-term, reversible and temporary nature of the construction and de-commissioning activities on landscape character will ensure that the overall effects will be, at worst, Minor. These are considered to be limited to the local context of the site boundaries, short term and temporary effects, overall a 'Not Significant' nature.

#### Visual Assessment

7.12.25 There are 38 residential receptors / groups that were assessed which may have visibility to the proposed development, those that have no visibility to the site were scoped out of the assessment.

7.12.26 In summary, the main residential visual receptors within c.500m of the site have been assessed. The visual assessment established that no residential receptors would experience effects of a 'Significant' nature. The greatest levels of visibility are predicted from three main areas:

- Upper Llancarfen Valley receptors to the west of DA1; R1, R3 and R5;
- The Redlands Farm grouping to the north of DA 1 and DA 2; R25 and R26 and;
- Brook Lane properties to the east of DA 2; DA17, DA18, DA22 and DA24.

7.12.27 Three additional settlements within the study area were considered, the assessment concluded that there would be extremely limited visibility to the DAs from the settlements. The scale of visual effect was considered to be 'Negligible' therefore 'Not Significant' visual effects are concluded from the local settlements.

7.12.28 The network of footpaths and trails within 500m of the DA boundaries have been assessed.

7.12.29 Although no public rights of way cross the site areas, there are a number <200m that would have partial visibility towards the site area, the routes with at least a 'Medium' magnitude of change include:

- PROW VG|L5|28/3 Abernant Farm to White Wells a near footpath within the

upper Llancarfen Valley area;

- PROW VG|L5|28/2 White Wells to Leach Castle Farm a footpath within the upper Llancarfen valley to the west of DA 1, c.120m from the western site boundary;
- PROW Group VG/B2 15, 16,17,18 and 19 Ty'n-y-coed to Bonvilston, c.170m to the north of DA 1

7.12.30 Effects are considered to be 'Moderate-Major' at the greatest levels, but 'Not Significant' overall at scheme opening from these PROW's.

7.12.31 The main vehicular routes have been assessed and it is concluded the effects from the main 'A' roads that pass through the study area would be 'Not Significant'. These routes are subject to the greatest volume of traffic movements in the study area, notably the A48 corridor passing the villages of Bonvilston and St Nicholas to the north and the A4226 Five Miles Lane, which bisects the study area and DA 1 and 2. These roads are also prominent physical boundaries and visual detractors which form the boundary of LCA's and Special Landscape Areas due to the fact they visually separate adjacent landscape areas and are often where character transitions either side.

7.12.32 Visual effects upon the main transportation corridors within the study area are focussed to the A4226 as it passes between DA 1 and DA2 and a local unnamed lane within Llancarfen Valley, which adjoins the western boundary of DA 1. Despite the close distance, visibility is substantially restricted by mature roadside vegetation, and a low duration of effects. Not significant visual effects are concluded for all the road corridors.

7.12.33 Visual effects from the minor roads that pass close to the DAs have been considered as they are the location for numerous viewpoints. The viewpoint assessment concluded 'Not Significant' effects from these roads. It is noted that for road users all views would be transient and glimpsed in nature, of a short-term duration.

7.12.34 With regard to the construction and decommissioning phases, any effects on views and visual receptors during the construction and de-commissioning phases will be temporary and short term in duration. Any damaged fields as a result of de-commissioning activities will be re-seeded with a locally appropriate grassland mix, all landscape mitigation will remain so the level of visual containment of the sites will be unaffected. The effects would be short term and temporary and overall considered to be of a 'Not Significant' nature.

#### Viewpoint Assessment

7.12.35 The viewpoint assessment considered an extensive range of publicly accessible locations to illustrate the greatest (and representative) levels of visibility to the 3 solar Development Areas within the study area. All locations were agreed in consultation with Vale of Glamorgan County Borough Council. In total 17 no. viewpoint locations have been assessed, the viewpoints considered close range views to the DAs and also the potential visibility of multiple DAs distributed within the study area.

7.12.36 A single viewpoint was considered to experience visual effects of a 'significant' nature (VP 5). The slightly elevated (in relation to the site) close range viewpoint is located in the field c.300m from the northern site boundary in the small-scale pastures between the sites and A48 road corridor (Bonvilston). This offers open views over the site and

as expected provides an extensive view of the solar arrays primarily within DA 1 Pancross. The viewpoint is representative of users of the public right of way between Bonvilston and Whitewell. It is however noted that the viewpoint location represents the most open and visible location upon this section of the footpath with views along the route often offered partial screening from field boundaries.

- 7.12.37 The remaining viewpoints, despite some locations offering visibility to the Development Areas which for some (mostly close range locations) would experience up to Moderate and Moderate-Major level of effect, these were all considered to be of a 'Not Significant' nature. These are effects that although considered to be noticeable in many instances, would not be dominating when the development is viewed within the overall visual environment. These would be effects that would not be material in the planning decision making process.

#### Cumulative Summary

- 7.12.38 As discussed in Section 7.11 opportunities exist for potential cumulative views, where more than one solar farm, including the proposed development areas, may be seen either simultaneously or sequentially. The site is considered independently and in combination where applicable within the assessment. Solar farms with the potential to generate cumulative effects include those which; are constructed, are in construction; have planning permission and are not yet constructed; or, are awaiting determination of planning permission. The baseline assessment confirmed that there are no other cumulative solar schemes within the study area.
- 7.12.39 Overall cumulative landscape and visual effects are only noted as a result of the additional Ref 2 (Parc Dyffryn Solar, Vianshill) scheme with the host Oaklands. Effects are concluded to result in cumulative effects of a Not Significant nature. Visual effects would (at the most adverse) be discernible in the view and limited to 'combined - in succession' views in very limited geographical area between both schemes. Landscape effects would be indirect, also focussed to the c.1.6km wide zone between both schemes, a heavily wooded and undulating area. Cumulative landscape effects are concluded to result in a slight additional change, in conjunction with Ref 2, to landscape character.

#### Residual Impacts

- 7.12.40 This assessment of landscape and visual effects has considered the likely 'Significant' direct and indirect effects of the proposed development including the prescribed landscape mitigation measures during construction, operation and decommissioning. Mitigation measures are permanent and discussed in detail in Section 7.8, they are considered to positively contribute to the landscape structure of the site and local area. Landscape and visual issues were also considered during the iterative design process, pre assessment, which resulted in changes to the scheme design; the omission of deployment areas to the west of DA 1 and west of DA 2. The identified landscape and visual effects are therefore also the residual effects. Where the Development Area specific mitigation will alter long term landscape and/or visual effects this has been noted in the assessment conclusions.

#### Final Comment

- 7.12.41 This LVIA demonstrates that the proposed Development Areas of Oaklands Solar

Farm could be successfully integrated into the local landscape of the Vale of Glamorgan (partially within an area identified as a 'Solar Area of Search') without causing significant and wide scale harm to the landscape character. No significant landscape effects are concluded upon the identified landscape receptors. The development allows for opportunities for enhanced mitigation, the reinstatement of lost historic field structure and management of the unused areas of the development site.

- 7.12.42 Whilst one 'significant' visual effect is noted, this is upon a near PROW and focussed to a particular location with the most open visibility. It should be noted that whilst an effect may be significant, that does not necessarily mean that such an impact would be unacceptable. Overall, the assessment has established that visual effects of the greatest magnitude (major/moderate) would be focussed upon a limited number of residential and recreational (PROW) receptors only, that are close to, or have views over, the site boundary. Outside of this near zone, visual effects reduce further, and continue to be of a 'Not Significant' level. It is expected that the extensive proposed planting mitigation and management of existing perimeter vegetation over time will further filter views to the 3 Development Areas and reduce the level of visual effects.



## **8. NOISE AND VIBRATION**

## 8.1 INTRODUCTION

8.1.1 This chapter presents an assessment of the potential environmental effects of the Proposed Solar Farm and Battery Energy Storage System with regard to noise. It describes the methods used to assess the effects, the baseline conditions that currently exist and potential future baseline in the vicinity of the Site and the potentially affected noise sensitive receptors. The chapter also sets out direct and indirect effects arising from the construction and operation of the Proposed Development and provides details of the mitigation measures required.

8.1.2 The assessment includes the consideration of:

- information on existing baseline sound level climate;
- information on the noise levels from site noise sources;
- information and predictions on the noise and vibration impact on NSRs from construction activities;
- information and predictions on the noise impact on nearest sensitive receptors (NSRs) from plant operations;
- information on the cumulative impact of other permitted site activities on Site or in the local area; and
- where appropriate, information on noise mitigation measures to comply with current noise standards and guidance.

8.1.3 The above potential noise impacts are considered in the context of the existing background noise at the site, which is generally affected by road traffic movements and birdsong.

8.1.4 **Appendix 8.2** (Doc Ref. 4.01.8) provides details of technical terms within the chapter, for ease of reference. There is also a chart showing typical everyday noise levels to assist in understanding the subjective level of noise in terms of decibels.

8.1.5 The associated plant will consist of the following:

- Photovoltaic panels and associated supporting frames and ground mounting;
- Inverter stations;
- Transformer stations (housed in prefabricated containers);
- PCS (battery inverters and transformers);
- Battery Energy Storage System ('BESS') containers,
- Cabling linking battery containers, inverter and transformer stations to the substation;
- Perimeter fencing and CCTV (invisible infra-red illumination at night, only pointing into the site);
- DNO Substation;
- Client Substation;
- Internal service roads;
- Scheme of landscaping;
- Temporary Compound & set down area.

### Proposed Development

8.1.6 A full description of the proposal is provided in Chapter 2.0 of this Environmental

Statement. The location of the Proposed Development (the Site) is shown on Drawing **SRE1113/02/01** (Doc Ref. 2.01).

#### Solar Farm Operation

- 8.1.7 Solar Farms are an inherently quiet installation due to the fact that there are no moving parts. The associated plant to convert the DC current to AC at the correct voltage involves the use of inverters and transformers.
- 8.1.8 Transformers are not particularly noisy plant and generate a low level 'hum' at relatively close distances driven by the mains frequency. By its nature, the Solar Farm is only operational during daylight hours, however during peak generation during the summer months (i.e. under conditions of high temperatures) there may be occasional periods when the operation of the inverters and transformers occurs just after sun rise (i.e. earliest sunrise in the year being around 0430 to 0700 hours), but this would not be at full capacity and noise levels would be less than used in the assessment.

#### Battery Storage Operation

- 8.1.9 At times of low demand for electricity, where generation exceeds demand (typically during the night-time), the battery storage facility would store this excess energy from the grid within the battery cells. This energy would then be available to be rapidly (within a matter of milliseconds) released back into the grid, at times when energy demand outweighs supply. Accordingly, the proposed facility assists in stabilising the capacity of the grid and supports a reliant and resilient energy supply system.
- 8.1.10 The system of communication between the grid and the battery storage system is fully automated. The facility is able to respond automatically to any dip in grid frequency by exporting/importing the required energy to stabilise the grid.
- 8.1.11 A sound survey has been carried out in the vicinity of the Proposed Development to determine existing representative background and residual sound levels. The aim of the sound survey was to:
- identify the existing baseline sound levels for use as a reference for background and residual sound levels in the assessment of impacts related to the operation of the Proposed Development;
  - enable the assessment baseline to be established and understand the effects of existing developments on the future baseline; and
  - characterise the nearest noise sensitive receptors (NSRs) or noise sensitive sites;
- 8.1.12 The methodology and approach to the sound survey and assessment included the following:
- establishing the nearest noise sensitive receptors;
  - evaluation of present and assessment background and ambient sound levels;
  - evaluation of noise sources from the Proposed Development in terms of typical operating levels;
  - assessment of specific noise sources in relation to appropriate guidance and standards (e.g. TAN11, BS5228:2009+A1:2014+A1:2019);
  - evaluation of construction noise and vibration sources relative to nearest receptors; and



- identification of any noise control necessary where noise generated from the Proposed Development has been identified as exceeding relevant guidance and standards.

#### Consultation

- 8.1.13 The noise assessment has benefited from pre-application discussions with Vale of Glamorgan Council Environmental Health Officer and submissions relating to the scoping exercise. During the consultation process, the assessment methodology, baseline monitoring positions and relevant standards and guidance were agreed.

#### Future Baseline

- 8.1.14 The site has been assessed against the current baseline which includes all relevant established permitted noise sources. We therefore consider that this would represent a good indication of the likely future baseline within the assessment of the potential impact.

#### Competence

- 8.1.15 The author of this assessment has over 35 years' experience in the field of industrial and environmental acoustics with a Masters' Degree in Acoustics and is a Member of the Institute of Acoustics, Member of the Association of Noise Consultants, Member of the Academy of Experts and an Incorporated Engineer.

## 8.2 GENERAL PLANNING POLICY

### Introduction

- 8.2.1 The ambient environmental noise at any location will vary according to the activities in progress around the location. In the vicinity of a busy motorway, for example, the noise level will remain fairly constant due to the relatively steady noise input from road traffic, whereas the noise level close to a source of high noise over short periods, such as an airport, will vary over a much wider range. It is therefore necessary to consider how to quantify the existing noise levels in an area in order to accurately assess the acceptability of the introduction of a new noise source.

### Planning Policy

- 8.2.2 To establish the impact of the Proposed Development in respect of noise on existing or proposed residential receptors, it is necessary to consider the relevant noise guidance, standards and policy for an industrial development. The following section examines the guidance and establishes the methodology to be adopted for assessing noise impacts. It outlines the key planning policy and guidance that relates to the assessment of residential amenity and protection of residents from general environmental and industrial noise sources.

### Technical Advice Note (Wales) 11 (TAN 11) 'Noise': 1997

- 8.2.3 Within the introduction of Technical Advice Note (Wales) 11: 1997 'Noise' it states:

*"This note provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business."*

- 8.2.4 Technical Advice Note 11 (TAN 11) provides the following information:
- It indicates how noise issues should be handled in development plans and development control;
  - outlines ways of mitigating the adverse impact of noise;
  - provides specific guidance on noisy and noise-sensitive development;
  - introduces the use of noise exposure categories;
  - gives guidance on the use of planning conditions relating to noise.
- 8.2.5 The guidance introduces the concept of Noise Exposure Categories (NEC), which have been derived to assist local planning authorities in their consideration of planning applications for residential development near transport-related noise sources. The NEC procedure is only applicable for the introduction of a new residential development into an area with an existing noise source. At Annex 1, guidance is given for various types of noise sources, which includes road traffic, aircraft and railways.
- 8.2.6 For reference, the recommended noise exposure categories for new dwellings near existing sources are shown below in Table 8.1. Note that these noise categories are based upon measurements taken in an open site (i.e. without any proposed noise attenuating features in place).
- 8.2.7 The level at the boundary of NEC A and NEC B is based on guidance provided by the World Health Organisation (WHO) health criteria from 1980, which states that “*general daytime outdoor noise levels of less than 55dB(A) Leq are desirable to prevent any significant community annoyance*”.
- 8.2.8 The night-time noise level at the boundary of NEC A and NEC B is also based upon the WHO health criteria, stating “based on limited data available, a level of less than 35dB(A) is recommended to preserve the restorative process of sleep”.
- 8.2.9 **Table 8.1** below provides an interpretation of the NEC categories in terms of granting planning permission.

**Table 8.1: NEC Categories**

NEC Category	Description	Noise Range LAeq,T dB
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.	<55dB(A) daytime (16hr) <45dB(A) night-time (8hr)  Road, rail and mixed sources

B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.	55-63dB(A) daytime (16hr)  45-59dB(A) night-time (8hr)  Road, rail and mixed sources
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8.2.10 In applying these noise exposure categories, it states:

*“Different indices have been used to describe noise from different sources, and limits have been set over different time periods. This has caused confusion, and this advice follows the move towards consistency advocated in BS 7445: 1991 by expressing all noises of LAeq,T. The recommended time periods are 0700-2300 and 2300-0700.”*

8.2.11 Within the general guidance it states “where there is a clear need for new residential development in an already noisy area some or all NECs might be increased by up to 3dB(A) above the recommended levels. In other cases, a reduction of up to 3dB(A) may be justified.”

8.2.12 For noisy industrial development, the guidance refers to BS 4142 - ‘Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas’ (updated in 2014).

**BS4142: 2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’**

8.2.13 BS4142: 2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’ is based on the measurement of background sound using LA90 noise measurements, compared to source noise levels measured in LAeq units. Once any corrections have been applied for source noise tonality, distinct impulses etc., the difference between these two measurements (i.e. known as the ‘rating’ level) determines the impact magnitude. Typically, the greater the difference, the greater the magnitude of the impact.

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact (although this can be dependent on the context).
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact (although this can be dependent on the context).

8.2.14 In order to establish the rating level, corrections for the noise character need to be taken into consideration. The Standard states that when considering the perceptibility:

*“Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention.”*

8.2.15 The subjective method adopted includes the following character corrections:

**Table 8.2: BS4142: 2014 Character Corrections**

Level of Perceptibility	Correction for tonal character dB	Correction for impulsivity dB	Correction for intermittency dB	Correction for 'other character' dB
Not perceptible	0	0	0	0
Just perceptible	+2	+3	0	0
Clearly perceptible	+4	+6	+3*	+3*
Highly perceptible	+6	+9	+3*	+3*

\*Standard defines this should be readily distinctive against the residual acoustic environment, it is interpreted therefore to be either clearly or highly perceptible as a character. If characteristics likely to affect perception and response are present in the specific sound, within the same reference period, then the applicable corrections ought normally to be added arithmetically. However, if any single feature is dominant to the exclusion of the others, then it might be appropriate to apply a reduced or even zero correction for the minor characteristics

**BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings'**

8.2.16 The British Standard BS8233 provides additional guidance on noise levels within buildings. These are based on the WHO recommendations and the criteria given in BS8233 for unoccupied spaces within residential properties.

8.2.17 The guidance provided in section 7.7 of BS8233 provides recommended internal ambient noise levels for resting, dining and sleeping within residential dwellings. **Table 8.3** provides detail of the levels given in the standard.

**Table 8.3: BS8233:2014 Indoor Ambient Noise Levels for Dwellings**

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB LAeq,16hours	-
Dining	Dining room/area	40 dB LAeq,16hours	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16hours	30 dB LAeq,8hours
Study and work requiring concentration	Staff/Meeting Room, Training Room	35-45dB LAeq8hours	
	Executive Office	35-45dB LAeq8hours	

8.2.18 This standard would be appropriate to apply to existing or proposed residential development. The Site noise contribution should be within the proposed internal noise levels, which would include the following noise limits:

- Living room areas: <=35dB LAeq,16hours (0700-2300 hours) [equivalent to an external level of approximately 65dB LAeq,16hours based on typical standard double-glazed units in the closed position and approximately 50dB LAeq,16hours in the open position].

- Bedrooms:  $\leq 30$ dB LAeq,8 hours (2300-0700 hours) [equivalent to an external level of approximately 60dB LAeq,8hours based on typical standard double-glazed units in the closed position and approximately 45dB LAeq,8hours in the open position].
- Offices: 35dB to 45dB LAeq, 8hours [equivalent to an external level of approximately 65dB to 75dB LAeq, 8hours based on typical standard double-glazed units in the closed position].

8.2.19 The above internal bedroom limits would comply with sleep disturbance criteria defined by World Health Organisation guidelines (WHO). The WHO night noise guidelines for Europe refers to sleep disturbance limit of 42dB-45dB LAmax for regular peak events within bedrooms [which is approximately 57dB-60dB LAmax external to the bedroom window in the open position].

#### World Health Organisation (WHO) Guidelines for Community Noise: April 1999

8.2.20 This document provides further updated information on noise and its effects on the community. Within the document for noise 'In Dwellings', it states that "The effects of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference". For bedrooms, the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30dB LAeq for continuous noise and 45dB LAmax for single sound events. Lower noise levels may be disturbing depending upon the nature of the noise source. At night-time, outside sound levels about 1 metre from the facades of living spaces should not exceed 45dB LAeq, so that people may sleep with bedroom windows open. This value was obtained by assuming that the noise reduction from outside to inside with the window open is 15dB. To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35dB LAeq. To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB LAeq. Where it is practical and feasible, the lower outdoor sound level should be considered to represent the maximum desirable sound level for new development.

#### World Health Organisation (WHO) Night noise guidelines for Europe: 2009

8.2.21 The WHO regional office for Europe set up a working group of experts to provide scientific advice to the Member States for the development of future legislation and policy action in the area of assessment and control of night noise exposure. Considering the scientific evidence on the thresholds of night noise exposure indicated by  $L_{\text{night,outside}}$  as defined in the Environmental Noise Directive (2002/49/EC), an  $L_{\text{night,outside}}$  of 40dB should be the target of the night noise guidance (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly.  $L_{\text{night,outside}}$  value of 55dB is recommended as an interim target for the countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach.

#### World Health Organisation (WHO) – Environmental Noise Guidelines for the European Region: 2018

8.2.22 The objective of the 'Environmental Noise Guidelines for the European Region' is stated in the Executive Summary of the report:

*"The main purpose of these guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise. Leisure noise in this context refers to all noise sources that people are exposed to due to leisure activities, such as attending nightclubs, pubs, fitness classes, live sporting events, concerts or live music venues and listening to loud music through personal listening devices. The guidelines focus on the WHO European Region and provide policy guidance to Member States that is compatible with the noise indicators used on the European Union's END."*

8.2.23 The document provides recommendations for road traffic, railway, aircraft, wind turbine and leisure noise based on a strong or conditional recommendation.

8.2.24 In terms of road traffic noise, where NSRs are predominantly affected by road traffic the 'strong' recommendation for protection of residential receptors is as follows:

*"For average noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic below 53 decibels (dB) Lden, as road traffic noise above this level is associated with adverse health effects. For night noise exposure, the DGG strongly recommends reducing noise levels produced by road traffic during night time below 45dB Lden, as night-time road traffic noise above this level is associated with adverse effects on sleep."*

#### Road Traffic Noise

8.2.25 The standard index used in the UK for describing road traffic noise is LA10, which is the 'A' weighted sound level in dB exceeded for 10% of the assessment period (ref. LA 111 Terms and Definitions). Daytime noise is assessed using the 18-hour LA10, following the methodology given in the Department of Transport's Calculation of Road Traffic Noise (CRTN).

8.2.26 For the proposed development during the construction phase, the vehicle movements would be restricted to a 10-hour daytime weekday period. Therefore, an assessment has been undertaken on the impact of road traffic in relation to the increase in noise level based on a 10-hour average using an LA10 index. In respect to impacts, a 10-hour period would present a worst case compared with the use of an 18-hour time frame and is therefore considered to represent a robust assessment.

8.2.27 For road traffic noise, the CRTN calculation method can be used to predict noise levels from the movement of traffic along adjacent roads. Construction and operation predicted noise levels at sensitive receptors can be compared with predicted noise without the Proposed Development, to establish any likely significant increase in overall traffic noise. Traffic data for the CRTN assessment presented in this chapter is based on the figures contained within the Transport Assessment (TA) which accompanies the planning application documentation.

8.2.28 The TA sets out existing and predicted traffic data for the assessment year based on established growth factors and known committed developments. In this regard the impact of road traffic noise is inherently a cumulative assessment.

8.2.29 According to CRTN where the traffic flow volumes are very low (i.e., where traffic flows below 50 vehicles per hour or 1,000 vehicles per 18 hours) then the CRTN methodology is unreliable (ref. paragraph 30 of CRTN). For the assessment of on-site traffic, we have therefore applied ISO9613-2 calculation methodology using a 'line source' to represent moving vehicles with appropriate speed and empirical sound power levels obtained from other similar sites in the UK.

#### Guidance on Construction Noise

##### BS 5228:1 2009+A1: 2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites'

8.2.30 BS5228 refers to: *"the need for the protection against noise and vibration of persons living and working in the vicinity of, and those working on, construction and open sites. It recommends procedures for noise and vibration control in respect of construction operations and aims to assist architects, contractors and site operatives, designers, developers, engineers, local authority environmental health officers and planners."*

8.2.31 Part 1 deals with noise in terms of background legislation and gives recommendations for basic methods of noise control relating to construction and open sites where significant noise levels may be generated. The guidance is aimed at giving advice on achieving 'best practice' in controlling noise and vibration from construction and open sites. There is an example of noise limits given in Annex E, which sets out cut-off limits between 65dB(A) and 75dB(A) or 5dB(A) above the ambient noise, whichever is the greater. Part 2 of BS 5228 deals specifically with vibration control and provide the legislative background to the control of vibration and recommendations for controlling vibration at source and management controls (e.g. liaison with communities, supervision, preparation and choice of plant etc.).

##### Future Baseline

8.2.32 The site has been assessed against the current baseline which includes all relevant established permitted noise sources. We therefore consider that this would represent a good indication of the likely future baseline within the assessment of impact.

##### Guidance on Ground Vibration

8.2.33 Most of the available data relating to the effects of ground vibration on buildings have been obtained during tests using explosives. From these studies, two regimes of building damage have evolved, those of structural damage involving major failures of whole or parts of buildings and architectural damage involving cracking plaster or other brittle materials.

8.2.34 Architectural, sometimes called cosmetic, damage is thought to be more annoying than dangerous and would start to occur at lower levels of vibration than structural damage. Recent International and BS define and categorise building damage under three main headings:

- Cosmetic - the formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces. In addition, the formation of hairline cracks in mortar joints of brick / concrete block construction.

- Minor - the formation of large cracks or loosening and falling of plaster or drywall surfaces, or cracks through bricks/concrete blocks.
- Major - damage to structural elements of the building, cracks in support columns, loosening of joints, splaying of masonry cracks, etc.

- 8.2.35 An investigation into the effects of induced vibration undertaken by the British Standards Institution has culminated in BS7385:1993; Part 2 which gives guide values to prevent cosmetic damage to property of 15 to 20mms-1 between 4Hz and 15Hz, whilst above 40 Hz the guide value is 50mms-1. The BSI suggests reducing these figures by a factor of 50% for continuous vibration, for example from rail traffic, thus the values become 7.5-10mms-1 at 4-15Hz, and 25.0mms-1 at 40Hz and above.
- 8.2.36 With regard to the threshold of cosmetic damage, for continuous vibration such as road or rail traffic, levels below 5.0mms-1 are unlikely to be significant. For a given level of vibration the risk of damage decreases as the frequency of that vibration increases.
- 8.2.37 BS5228-2:2009 Annex B gives guidance on the effects of vibration levels, which is summarised below in **Table 8.4**.

**Table 8.4: Guidance on Effects of Vibration Levels**

Vibration Level mm.s <sup>-1</sup>	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10	Vibration is likely to be tolerable for any more than a very brief exposure to this level.

Vibration Nuisance

- 8.2.38 The fact that the human body is very sensitive to vibration can result in subjective concern being expressed at energy levels well below the threshold of damage.
- 8.2.39 Guidance on the human response to vibration in buildings may be found in British Standard BS 6472- 1:2008. Weighting curves related to human response to vibration of buildings are presented within this document. Estimates are given on the probability of adverse comment, which might be expected, from human beings experiencing vibration in buildings. This is based on a vibration dose value (VDV), assessed from frequency weighted vibration measurements and based on a 16-hour day.

Road Traffic Noise

- 8.2.40 No guidance exists for assessing increased traffic noise on existing roads as a result of traffic generated by new developments. However, any change in noise levels along affected roads would be relevant to subsequent planning applications.
- 8.2.41 The DMRB LA 111 provides guidance on the magnitude of change in terms of road traffic noise. The procedure for assessing noise impacts advises the use of a LA<sub>10</sub>



measurement index based on a daytime 18-hour time period (i.e. 0600 to 2400 hours) and night-time period (i.e. 0000-0600 hours). Further assessment of the impact would be required where changes of 1dB(A) or more are expected in the short-term and changes of 3dB(A) in the long term.

### 8.3 ASSESSMENT APPROACH

8.3.1 To establish the impact of the proposed development in relation to noise on existing or proposed residential areas, it is necessary to consider the relevant noise guidance, standards and policy for the relevant development. The following information examines the guidance and establishes the methodology to be adopted for assessing noise impacts.

8.3.2 Information used in this assessment has been obtained from the following sources:

- Ordnance Survey maps of the local area;
- Site plans of working areas;
- BS5228-1:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites – Noise;
- Department of Transport 'Calculation of Road Traffic Noise': 1988;
- Design Manual for Roads and Bridges, LA 111 Noise and Vibration: Rev 2 (May 2020);
- ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors;
- BS7385:1993, Part 2; Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration;
- BS6472: 2008 'Guide to the evaluation of human exposure to vibration in buildings';
- New Zealand Transport Agency research paper entitled 'Ground Vibration from Road Construction' in May 2012;
- BS 4142: 2014 +A1:2019 'Methods for rating and assessing industrial and commercial sound'; and
- BS8233:2014 'Guidance on sound insulation and noise reduction for buildings'

### Environmental Effects Assessment

#### Noise Predictions

8.3.3 In terms of noise predictions this assessment has used the calculation method based upon ISO9613-2, which is an internationally recognised methodology, which takes into account source distance, screening effects, operating time and direction in relation to the nearest sensitive receptor. The noise model includes suitable calculation method settings and assumes that all relevant plant is operational to ensure the highest likely noise levels are assessed. Section 7.5 provides further detail of the noise model settings and assumptions made in respect of plant noise levels.

8.3.4 The plant noise levels assumed within this assessment have been based on actual noise levels measured at other similar sites in the UK and from advice provided by Technology Providers who are involved in the detailed design of such developments.

**Environmental Effects Assessment Evaluation**

8.3.5 The level of an effect is a function of the sensitivity or importance of the receiver, or receptor, and the scale or magnitude of the effect. In the case of this assessment the level of the effect has been determined by reference to existing guidance and standards that are explained below.

8.3.6 Four types of receptor have been identified:

- Residents of existing houses adjacent to the Site who could experience temporary site construction noise during daytime periods.
- Residents of existing houses adjacent to the Site who could experience site operational noise during daytime and night-time periods .
- Residents of existing houses who could experience additional and temporary road noise from the construction of the Site.
- Ecological sensitive sites, which may have wildlife receptors.

**Construction Noise**

8.3.7 For residents of houses that could be exposed to construction noise, BS5228:2009+A1:2014 is considered to be the appropriate standard to be applied. This standard does not prescribe limits but requires 'best practicable means' ("BPM") to be employed to control noise generation. The criterion therefore is that BPM should be employed and conditions implemented for example to restrict construction noise to non-sensitive hours.

8.3.8 The construction impact semantic scale, set out in **Table 8.5**, is based on the ABC method of assessment described in Annex E of BS5228, which sets out threshold values depending upon the ambient noise at receptors, which have been defined from the baseline sound survey.

8.3.9 According to the guidance found within the DMRB LA 111, the lowest observable adverse effect level (LOAEL) and significant observable adverse effect level (SOAEL) for noise sensitive receptors during construction are shown in **Table 8.5**.

**Table 8.5: Construction Time Period – LOAEL and SOAEL**

Time Period	LOAEL	SOAEL	Guidance Level LAeq <sub>1hr</sub> dB
Day (0700-1900 hours Weekday and 0700-1200 Saturdays)	Baseline noise levels LAeq,T	Threshold level determined as per BS5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	65-70
Night (2300-0700 hours)	Baseline noise levels LAeq,T	Threshold level determined as per BS5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	45-50

Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS 5228-1:2009+A1:2014	55-60
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8.3.10 The magnitude of impact for construction noise is outlined in **Table 8.6** (as defined in DMRB LA 111).

**Table 8.6: Impact Magnitude Category: Construction Noise**

Magnitude of Impact	Construction Noise Level
Negligible	Below LOAEL
Minor (Slight)	Above or equal to LOAEL and below SOAEL
Moderate	Above or equal to SOAEL and below SOAEL +5dB
Major (Substantial/Severe)	Above or equal to SOAEL +5dB

8.3.11 DMRB LA 111 defines the short term and long-term scenarios which are considered to represent the situation when a new road opens (short term) and 15 years after a road opens (long term). The magnitude of change criteria is set out in **Table 8.7** for the short term and 8.8 for the long term.

**Table 8.7: Magnitude of Change – Road Traffic Noise – Short Term**

Short term magnitude	Short term noise change (dB $L_{A10,18hr}$ or $L_{night}$ )
Negligible	Less than 1.0
Minor (Slight)	1.0 to 2.9
Moderate	3.0 to 4.9
Major (Substantial/Severe)	Greater than or equal to 5.0

**Table 8.8: Magnitude of Change – Road Traffic Noise – Long Term**

Long term magnitude	Long term noise change (dB $L_{A10,18hr}$ or $L_{night}$ )
Negligible	Less than 3.0
Minor (Slight)	3.0 to 4.9
Moderate	5.0 to 9.9
Major (Substantial/Severe)	Greater than or equal to 10.0

8.3.12 The impact magnitude categories can then be correlated with the receptor sensitivity categories provided in **Table 8.15** to establish a level of effect as defined in **Table 8.16**.

**Construction Phase – Road Traffic**

8.3.13 The magnitude of impact for construction noise is outlined in **Table 8.9** (as defined in DMRB LA 111).

**Table 8.9: Impact Magnitude Category: Construction Road Traffic Noise**

Magnitude of Impact	Increase in basic noise level of closest public road used for construction traffic (dB)
Negligible	Less than 1.0
Minor (Slight)	Greater than or equal to 1.0 and less than 3.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Major (Substantial/Severe)	Greater than or equal to 5.0

Note: Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- 1) 10 or more days or nights in any 15 consecutive days or nights;
- 2) a total number of days exceeding 40 in any 6 consecutive months.

### Construction Phase – Vibration

8.3.14 For construction phase vibration the LOAEL and SOAEL is set out in DMRB LA 111 and provided in **Table 8.10**.

**Table 8.10: Impact Magnitude Category: Construction Phase Vibration**

Time Period	LOAEL	SOAEL
All time periods	0.3mm/sec PPV	1.0mm/sec PPV

8.3.15 The magnitude of impact for construction vibration is therefore determined in accordance with Table 8.11, as defined in DMRB LA 111.

**Table 8.11: Impact Magnitude Scale: Construction Phase Ground Borne Vibration for Residential Receptors**

Impact Magnitude	Vibration Level
Negligible	Below LOAEL
Minor (Slight)	Above or equal to LOAEL and below SOAEL
Moderate	Above or equal to SOAEL and below 10mm/s PPV
Major (Substantial/Severe)	Above or equal to 10mm/s PPV

Note: Construction vibration shall constitute a likely significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- 1) 10 or more days or nights in any 15 consecutive days or nights; or
- 2) a total number of days exceeding 40 in any 6 consecutive months.

### Operation Noise

8.3.16 **Table 8.12** shows the proposed impact magnitude methodology considering the guidance contained within BS4142: 2014+A1:2019 for fixed noise (e.g., transformer, battery storage units and inverters).

**Table 8.12: Impact Magnitude Scale – Future Noise Against Existing in Accordance with**

**BS4142:2014 (Operational Phase)**

Rating Level Above Background Noise dB(A) as BS4142: 2014+A1:2019	Description of Effect	Impact Magnitude
-10 to 0	No discernible effect on the receptor	Negligible
+0.1 to +4.4	Non-intrusive - Noise impact can be heard but does not cause any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Slight
+4.5 to +9.4	Intrusive - Noise impact can be heard and causes small changes in behaviour and/or attitude. Affects the character of the area such that there is a perceived change in the quality of life. Potential for non-awakening sleep disturbance.	Moderate
+9.5 or greater	Disruptive – Causes a material change in behaviour and/or attitude e.g., avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting to sleep. Quality of life diminished due to change in character of the area.	Substantial
Undefined*	Physically Harmful – Significant changes in behaviour and/or inability to mitigate effect of noise leading to psychological stress or physiological effects e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm	Severe

*Note: The 'rating' level is the difference between the noise contribution from Site and the existing background sound level allowing for any adjustments required for noise characteristics (i.e., tonal, impulsive or intermittent noise character). The Standard advises that rounding of numbers to one decimal place should relate to levels of 0.5dB or above, which is reflected in the table limits. The impact magnitude scales in Tables 7.12 to 7.13 are used in the assessment of operational noise impacts. \*The level at which physical harm occurs will be dependent upon a number of site-specific factors, which may include type and character of noise source, location, human sensitivities, duration and receptor expectations etc.*

8.3.17 The Institute of Environmental Management and Assessment (IEMA) has provided 'Guidelines for Environmental Noise Impact Assessment'. The guidelines set out an example of how changes in noise level may be assessed in terms of residual LAeq. This assists in determining the impact of Site operational noise relative to the context of the noise climate, which is detailed in Table 8.13.

**Table 8.13: Impact Magnitude Scale – General Site Noise**

Change in Sound Levels LAeq dB	Description of Effect	Impact Magnitude
< +2.9	No discernible effect on the receptor	Negligible
+3.0 to +4.9 (high receptor sensitivity)	Non-intrusive - Noise impact can be heard but does not cause any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Slight

+5.0 to +9.9 (high receptor sensitivity)	Intrusive - Noise impact can be heard and causes small changes in behaviour and/or attitude. Affects the character of the area such that there is a perceived change in the quality of life. Potential for non-awakening sleep disturbance.	Moderate
+10 or greater (high receptor sensitivity)	Disruptive – Causes a material change in behaviour and/or attitude e.g., avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting to sleep. Quality of life diminished due to change in character of the area.	Substantial
Undefined*	Physically Harmful – Significant changes in behaviour and/or inability to mitigate effect of noise leading to psychological stress or physiological effects e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm	Severe

*\*The level at which physical harm occurs will be dependent upon a number of site-specific factors, which may include type and character of noise source, location, human sensitivities, duration and receptor expectations etc.*

8.3.18 The WHO thresholds for night noise exposure indicated by  $L_{night, outside}$  as defined in the Environmental Noise Directive (2002/49/EC), relates to a  $L_{night, outside}$  level of 40dB to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly. Table 8.14 sets out the semantic scale for absolute levels relating to specific noise thresholds relating to rural areas and sleep disturbance.

**Table 8.14: Impact Magnitude Scale – Absolute Noise (Operational Phase) in accordance with WHO guidelines (night-time)**

Site Noise Levels LAeq dB 15mins	Subjective Response	Impact Magnitude
<=35	Complaint highly unlikely	Negligible
>35 to <=40	Complaint unlikely	Slight
>40 to 45	Marginal significance	Moderate
>45	Complaint Likely	Substantial
>55	Complaint highly likely	Severe

8.3.19 In order to determine the level of the effect, not only must the magnitude of this impact be determined but also the sensitivity of the receptors to the impact. For this assessment, the categories presented in Table 8.15 have been adopted.

**Table 8.15: Receptor Sensitivity**

Receptor Sensitivity	Type of Receptor
High	Dwellings / residential properties including houses, flats, old people’s homes, hospitals, caravans
Medium	Schools, churches and open spaces/conservation areas.
Low	Commercial premises including retails and offices etc.

Negligible	Industrial premises including warehouses and distribution etc.
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8.3.20 Based upon the assessment of impact magnitude and the sensitivity of individual receptors, the matrix shown in **Table 8.16** has been developed in order to provide an indication of the possible level of effect for each predicted noise impact. Given that there are many factors which may affect the level of the effect of an impact, not least, the character of the noise and timescales over which the noise operates, the overall level of effect must be assessed on an individual basis using professional judgement and experience. Therefore, whilst the matrix provides a useful indication of the likely significance it cannot be applied in all situations.

**Table 8.16: Level of Effect Matrix**

Impact Magnitude	Receptor Sensitivity		
	High	Medium	Low/Negligible
Severe	Major	Major / Moderate	Moderate / Minor
Substantial	Major / Moderate	Moderate	Minor
Moderate	Moderate	Moderate / Minor	Minor / Neutral
Slight	Minor	Minor / Neutral	Neutral
No Significant Impact (Negligible)	Neutral	Neutral	Neutral

8.3.21 Where a level of effect is defined as Major or Major / Moderate then the effect is likely to be considered significant i.e., an impact that is likely to be a key material factor in the decision-making process.

#### Survey Techniques

8.3.22 The monitoring of environmental noise undertaken during the assessment, has been carried out in terms of monitoring and meteorological conditions in accordance with advice given in BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'.

#### Limitations

8.3.23 There are no limitations encountered during the assessment process that would affect the analysis or conclusions to the Noise & Vibration Chapter. Covid restrictions were not in place during November 2021 during the period of baseline monitoring.

### 8.4 BASELINE CONDITIONS

#### Baseline Noise Surveys

8.4.1 A detailed environmental baseline sound survey was carried out in the vicinity of the nearest sensitive receptor (NSR) positions between Friday 26th to Monday 29th November 2021.

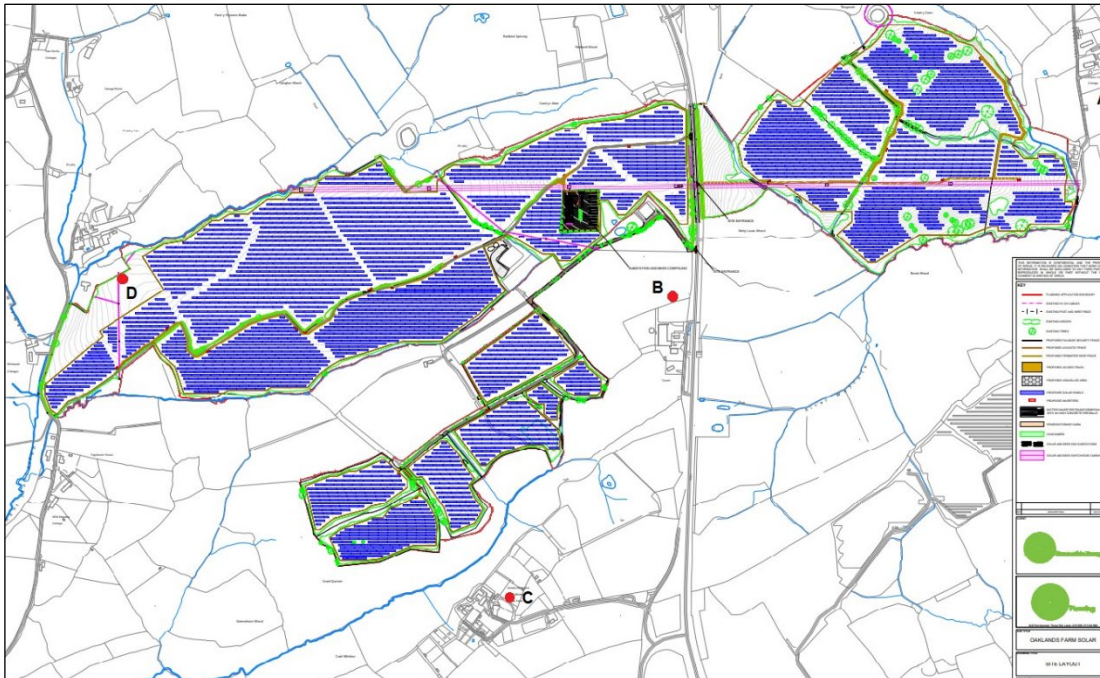
8.4.2 The main source of existing noise affecting nearest receptor properties relates to the movement of traffic along local and distant roads and birdsong.

8.4.3 Monitoring locations previously identified in consultation with the Local Authority are referenced to establish the NSRs, which are detailed below:

- Position A: Brooklands (grid reference 308956 173433)
- Position B: North of Blackland Farm (grid reference 307749 173143)
- Position C: Whitton Rosser Farm (grid reference 307444 172174)
- Position D: East of Whitewell (grid reference 306273 172969)

8.4.4 The fixed monitoring positions provide broadband noise data of the existing sound climate around the site, at the NSRs. The noise monitoring exercise was carried out over a 4-day period, which included a weekend, to establish the representative ambient sound climate. Details of the instrumentation used for the survey are detailed in **Appendix 8.3** (Doc Ref. 4.01.8). The noise monitoring positions are presented in **Figure 8.1** below.

**Figure 8.1: Noise Monitoring Positions**



Baseline Sound Survey Results

8.4.5 The results of average noise levels and representative background levels recorded at the fixed monitoring positions are presented in **Table 8.17** and detailed measurements in **Appendix 8.4** (Doc Ref. 4.01.8).

**Table 8.17: Baseline Levels during Daytime (0700-2300 hours)**

Location (Refer to Figure 7-1)	Average LAeq dB	Average LA10 dB	Average LA90 dB	Representative LA90 dB	LAmx dB Range
A. East: Brooklands	49	49	42	40	45-89
B. East to SE: North of Blackland Farm	59	62	51	45	46-83



C. South: Whitton Rosser Farm	46	48	41	36	43-74
D. West: East of Whitewell	46	48	41	36	46-70

Note: Representative LA90 based on average or most commonplace value.

**Table 8.18: Baseline Levels during Night-time (2300-0700 hours) and Sunrise (0430-0700 hours)**

Location# (Refer to Figure 7-1)	Average LAeq dB	Average LA10 dB	Average LA90 dB	Representative LA90 dB	LAmx dB Range
A. East: Brooklands	39 (night) 41 (sunrise)	41 43	35 37	25 28	38-62 45-62
B. East to SE: North of Blackland Farm	51 54	54 57	39 41	34 34	55-76 61-73
C. South: Whitton Rosser Farm	39 40	42 43	34 34	26 30	34-68 45-59
D. West: East of Whitewell	36 35	38 38	31 30	26 29	38-56 45-62

Note: Representative LA90 based on average or most commonplace value.

**Identification of Noise Sensitive Receptors**

8.4.6 Based on relative distance to the Proposed Development from the associated site plant, the nearest sensitive receptors are provided below:

- R1. Whitton Rosser (south of Site)
- R2. Amelia Trust Farm (south)
- R3. Blacklands Farm (southeast)
- R4. Redland (north)
- R5. Whitewell (west)
- R6. Ty-n-Coed (west)
- R7-R8. Properties adjacent to Whitewell (west)
- R10. Brooklands (east)
- R11. Brook Lane (east)

8.4.7 For the operation, based on the results of the background noise survey and the guidance provided within BS4142:2014+A1:2019, the site rating level should not exceed the representative background level. **Table 8.19** provides the assessment of noise criteria relative to the solar farm operations.

**Table 8.19: Proposed Noise Criteria at NSRs (daylight and night-time operating hours)**

NSR (Refer to Figures 7-2 to 7-4)	Grid Reference X Y	Residual LAeq (dB)	Daytime Representative Background LA90 (dB)	Low Impact According to BS4142:2019

				Rating Level LAeq,T (dB)
R1. Whitton Rosser (south)	307444 172174	46 (day) 40 (sunrise) 39 (night)	36 30 26	<=36 <=30 <=30 <sup>5</sup>
R2. Amelia Trust Farm (south)	307238 172167	46 (day) <sup>2</sup> 40 (sunrise) <sup>2</sup> 39 (night) <sup>2</sup>	36 30 26	<=36 <=30 <=30 <sup>5</sup>
R3. Blacklands Farm (southeast)	307738 172792	59 (day) 54 (sunrise) 51 (night)	45 34 34	<=45 <=34 <=34
R4. Redland (north)	307606 173755	59 (day) <sup>1</sup> 54 (sunrise) <sup>1</sup> 51 (night) <sup>1</sup>	45 34 34	<=45 <=34 <=34
R5. Whitewell (west)	306224 172969	46 (day) 35 (sunrise) 36 (night)	36 29 26	<=36 <=30 <sup>5</sup> <=30 <sup>5</sup>
R6. Ty-n-Coed (west)	306200 173060	46 (day) <sup>3</sup> 40 (sunrise) <sup>3</sup> 39 (night) <sup>3</sup>	36 29 26	<=36 <=30 <sup>5</sup> <=30 <sup>5</sup>
R7. Whitewell (west)	306094 172814	46 (day) <sup>3</sup> 40 (sunrise) <sup>3</sup> 39 (night) <sup>3</sup>	36 29 26	<=36 <=30 <sup>5</sup> <=30 <sup>5</sup>
R8. Whitewell (west)	306130 172572	46 (day) <sup>3</sup> 40 (sunrise) <sup>3</sup> 39 (night) <sup>3</sup>	36 29 26	<=36 <=30 <sup>5</sup> <=30 <sup>5</sup>
R9. Brooklands	308804 173545	49 (day) 43 (sunrise) 41 (night)	40 28 25	<=40 <=30 <sup>5</sup> <=30 <sup>5</sup>
R10. Brook Lane	308731 173741	49 (day) <sup>4</sup> 43 (sunrise) <sup>4</sup> 41 (night) <sup>4</sup>	40 28 25	<=40 <=30 <sup>5</sup> <=30 <sup>5</sup>

<sup>1</sup> Assumed to be similar to R3 due to proximity to the A4226 road (Position B).

<sup>2</sup> This is in similar location to R1 (Position C)

<sup>3</sup> Assumed to be similar to R5 as in similar location (Position D)

<sup>4</sup> Assumed to be similar to R9 as in similar location (Position A)

<sup>5</sup> This is the absolute lower limit based on the fact that BS4142 is not reliable at low background and rating levels and a limit of 30dB LAeq is well below the sleep disturbance criteria with an open window according to WHO guidelines and BS8233:2014 which provides good sleep protection.

### Grid Connection

- 8.4.8 The grid connection is located adjacent to the Battery Storage Compound and therefore any connection works would be carried out during the site construction phase and included in the assessment of construction noise effects.

## 8.5 ASSESSMENT OF EFFECTS

### Incorporated Mitigation

- 8.5.1 Predicted noise levels from the Proposed Solar Farm and Battery Energy Storage System have been calculated using the design layout prepared in conjunction with assumed plant noise levels provided below. These noise levels are based on measured data from similar plant used on other UK Solar Farm sites. Mitigation

measures include the following:

#### Solar Panel Plant

- Design of the site to maximise wherever practicable the separation distance from NSR to plant equipment.
- Use of inverter systems mounted within enclosures or containers. Noise levels from the enclosure/container and cooling/heating system would be designed to achieve a level not exceeding 65dB(A) @ 1m, if above this level the use of acoustic fencing will be used to achieve this requirement.
- Noise levels from solar inverter transformer mounted within the inverter enclosure/container: 65dB LAeq @ 1m sound pressure level.
- Containerised substation switchgear noise level would be designed not to exceed a noise level of 65dB(A) @ 1m.

#### Battery Storage Plant

- Design of the site to maximise wherever practicable the separation distance from NSR to plant equipment.
- Noise levels from Battery Storage containers would produce a noise level of 65dB LAeq @ 1m.
- Noise levels from Inverter stations designed to a level not exceeding 75dB LAeq @ 1m sound pressure level.
- Transformer designed to a noise level not exceeding 72dB LAeq @ 1m.
- Substation switchgear container design noise level of 65dB(A) @ 1m sound pressure level.
- Acoustic screen around the Battery Storage compound on all 4 sides to a height of 4m. The screen should be solid and have no gaps below or between sections of panels or between panels and supports. The minimum panel mass would typically be circa 10kg/m<sup>2</sup>.
- Fire walls would be installed between the battery storage containers formed by concrete walls to a height of 3m.

### Construction / Decommissioning Phase Effects

#### Construction Plant Noise

- 8.5.2 Construction works would involve the movement of soils, piling and the construction of infrastructure and solar panels and associated plant. Excavators, haulage lorries, hydraulic piling, cranes, mobile plant, concrete plant and power tools would all, at some time during the construction programme, be operating on the Site. In addition, ancillary equipment such as small generators, pumps and compressors may also be operating on occasion.
- 8.5.3 The above noise sources and their associated activities would vary from day to day, may be in use at different stages of the construction period, and for relatively short durations. The noisiest activities are expected to be generated during soil movement and site set-up during the initial stages of construction and during plant installation when piling rigs, power tools, mobile plant or similar may be in use.
- 8.5.4 The actual noise level produced by construction work would vary at the nearest

property boundary at any time depending upon a number of factors including the plant location, duration of operation, hours of operation, intervening topography and type of plant being used (see **Appendix 8.5** (Doc Ref. 4.01.8) for details of the construction plant inventory that has been used to inform the assessment).

- 8.5.5 Empirical field data obtained from plant on site and noise data from library or manufacturer’s data have been used to calculate the expected resultant noise contribution at the nearest property boundary locations during daytime and sunrise morning period operations.
- 8.5.6 The results of calculations for vehicle movement, infrastructure, PV and Battery Storage installation and general site activities are shown below in **Table 8.20**.
- 8.5.7 Construction works would take place during normal daytime operating hours. The daytime construction activities and associated noise levels are provided in **Table 8.20**, which is based on the ABC method of assessment within BS5228: 2009+A1:2014 (Annex E.3.2.).

**Table 8.20: Construction Noise Predictions**

NSRs (Refer to Figures 7-2 to 7-4)	Approximate Distance to receptor (m)	Works	Noise Level range at NSRs, LAeq <sub>1hr</sub> dB	Typical Residual Sound (i.e. existing) LAeq dB (LOAEL)	BS5228 Threshold Value LAeq dB Daytime (SOAEL)
R1. Whitton Rosser (south)  R2. Amelia Trust Farm	160-1400	Piling (mini rig)	29-49	46	65
	140-1400		33-54		
	160-1400	Site Preparation	34-53		
	140-1400		26-53		
	160-1400	General site activities	38-54		
R3. Blacklands Farm (southeast)	160-1400	Piling (mini rig)	29-49	59	65
	150-1400		33-53		
	160-1400	Site Preparation	34-53		
	150-1400		26-52		
	160-1400	General site activities	38-54		
	Infrastructure				

		PV installation			
R4. Redland (north)	330-1400 320-1400 330-1400 320-1400 330-1400	Piling (mini rig) Site Preparation General site activities Infrastructure PV Installation	29-41 33-46 34-46 26-45 38-47	59	65
R5. R7. R8. Whitewell (west) R6. Ty-n-Coed (west)	65-1400 55-1400 65-1400 55-1400 65-1400	Piling (mini rig) Site Preparation General site activities Infrastructure PV Installation	29-59 33-64 34-64 26-63 38-64	46	65
R9. Brooklands R10. Brook Lane	180-900 170-900 180-900 170-900 180-900	Piling (mini rig) Site Preparation General site activities Infrastructure PV Installation	32-47 37-52 38-52 30-50 42-53	49	65

8.5.8 On the basis of the above predictions the increase in noise, as a result of construction, is likely to result in an impact magnitude classification of **negligible to slight** resulting in a **neutral to minor** level of effect at receptors.

8.5.9 The application of applying best practice in accordance with BS5228-1:2009+A1:2014

would also assist in minimising the impact from construction noise.

**Road Traffic Noise**

Construction & De-commissioning Phase

- 8.5.10 According to the Construction (Traffic) Method Statement, the construction of the solar farm is expected to take circa 6 months to complete. This would include around 150 staff (spread over the three plots) on site during the construction phase and between 15 and 225 HGV deliveries per month (spread over the two land areas (east and west of the A4226 road), which, under peak periods of vehicle movements would only amount to just over 18 HGVs travelling to and from Site during a daytime period. The number of HGVs during an hour period is therefore unlikely to be more than 2 in any one hour.
- 8.5.11 The proposed operating hours for construction are:
  - Monday to Friday 0800 hours to 1800 hours
  - Saturdays 0800 hours to 1600 hours
- 8.5.12 Taking into account HGV peak movements to the set down areas off the A4226 road and staff movements of vehicles, we have assessed the highest likely noise levels at NSRs local to the A4226, which is provided below in **Table 8.21**.

**Table 8.21: Predicted Highest Likely Noise Level from Road Traffic Noise during the Construction Phase at NSRs (refer to Appendix 7.5 for noise mapping)**

NSR (Refer to Figures 7-2 to 7-4)	Measured Residual LA10,T dB at NSR (Saturday & Weekday)	Noise contribution from construction traffic LA10,T dB	Cumulative level with site noise & residual LA10,T dB	Level difference LA10,T dB	Impact
R1. Whitton Rosser (south)	41-52	34	41.8-52.1	+0.1 to +0.8	Negligible
R2. Amelia Trust Farm	41-52	33	41.6-52.1	+0.1 to +0.6	Negligible
R3. Blacklands Farm (southeast)	61-64	47	61.2-64.1	+0.1 to +0.2	Negligible
R4. Redland (north)	61-64	49	61.3-64.1	+0.1 to +0.3	Negligible

- 8.5.13 The above results show the increase in road traffic noise at NSRs during the construction phase would be between +0.1dB and +0.8dB LA10<sub>9hrs</sub>. According to **Table 8.7** the increase in road traffic noise would be **negligible** impact and **neutral** level of effect and is therefore not significant in EIA terms.
- 8.5.14 The decommissioning phase is likely to involve similar or fewer vehicle movements in order to remove the plant from site, we would therefore expect impacts and effects to be similar to that concluded for the construction phase.

Operational Phase – Road Traffic Noise

- 8.5.15 Once operational, the solar farm will be unmanned and access for occasional maintenance and inspections will be typically made by light goods vehicles, e.g. vans

or 4x4 vehicles. Maintenance will occur roughly once a week. In view of the very limited vehicle movements to and from the Solar Farm site during the operational phase no significant impacts would occur in relation to road traffic noise at NSRs. The impact would therefore be **negligible** and **neutral** significance.

#### Construction of Grid Connection

- 8.5.16 The grid connection is adjacent to the Battery Storage facility and as such will not require off site excavation and infilling outside of the site boundary. The application of 'best practicable means' would be applied as indicated for the construction phase of works and it is anticipated that the highest impact magnitude from grid connection associated noise and vibration would be a **neutral** significance effect and **negligible** impact magnitude. None of the effects would be significant in EIA terms and any effects would also be temporary in nature and short in duration.

#### Decommissioning of Grid Connection

- 8.5.17 At the end of its operational life, it is considered that no potential significant effects in relation to noise and vibration would result from the decommissioning of the grid connection.

### Vibration

#### Construction & Decommissioning Phase

- 8.5.18 The highest levels of vibration generated by plant is likely to include the following:
- Small hydraulic piling rigs
  - Compaction plant
  - Loading or unloading of HGVs
- 8.5.19 The distance from nearest residential receptors to any likely use of hydraulic piling rigs, mobile plant and offloading of HGVs is likely to be a minimum distance of 55 to 60 metres based on the closest NSRs to solar panels and access tracks.
- 8.5.20 The New Zealand Transport Agency published a research paper entitled 'Ground Vibration from Road Construction' in May 2012 (refer to **Appendix 8.7**), which includes a table of measured PPV values for different types of plant. The results indicate that vibratory compaction would typically produce a vibration level of 0.15mm/sec at 50m distance. Similarly, the report indicates that the loading of trucks produces a vibration level of 0.1mm/sec PPV at 50m distance and small hydraulic or screw piling rigs produce around 0.1mm/sec PPV at a similar distance.
- 8.5.21 Based upon the above information, it is evident that even at the closest approach to existing residential properties, the likely levels of ground-borne vibration would be at or below perceptible levels of vibration (i.e. 0.3mm/s) at all receptors. The results of empirical measurements of vibration from vibratory plant at distances greater than around 30 metres according to BS6472:2008 would indicate that the vibration levels are unlikely to give rise to an 'adverse comment' from a nuisance aspect.
- 8.5.22 It should be noted that the type of equipment, ground conditions and structural form could all affect the resultant level of vibration. At this stage, it has been assumed that the highest likely vibration level scenario occurs (i.e., a conservative estimate of potential effects).

8.5.23 The levels of vibration, as a result of the operation of mobile plant or offloading of dump trucks, are likely to result in an impact magnitude classification of **negligible** and a level of effect of **neutral** during general and peak vibration during the construction phase. Similarly, during de-commissioning the use of mobile plant and loading of HGVs to remove plant from site would produce levels of vibration that are at or below the level of perceptibility and therefore no significant effects would occur.

#### Vibration from Road Traffic

8.5.24 Monitoring of ground-borne vibration have been previously undertaken of vehicles travelling along local roads at other sites in the UK. Further detail is provided in **Appendix 8.7** and vibration parameters are presented in **Appendix 8.6** (Doc Ref. 4.01.8).

8.5.25 The results of seismograph monitoring showed that based on a distance of 2m from the kerbside of the road during HGV movements the maximum levels of vibration recorded ranged between 0.2mm/s to 0.5mm/s. This level of vibration is very low (i.e. where 0.3mm/sec is said to be the level below which vibration is imperceptible) and experience has shown that according to BS6472: 2008, even when properties are at this distance, there is normally a 'low probability of adverse comment' over the operating period indicating that nuisance conditions are unlikely.

8.5.26 In view of the separation distance to NSRs it is clear that vibration levels would be imperceptible and therefore produce a **negligible** impact and **neutral** impact significance. In terms of BS6472 this would conclude that vibration levels would be well below a 'low probability of adverse comment' and therefore nuisance conditions are highly unlikely to occur.

#### Operational Noise Effects

##### Plant Noise

8.5.27 The following section provides an assessment of predicted noise levels from the operation of the proposed Solar Farm and Battery Storage compound. The Applicant and their EPC contractor have been progressing the design of the Proposed Development, and this has enabled meaningful indicative scheme drawings to be prepared (see **Figure 8-1**). The design of the Site has been developed in sufficient detail to enable an accurate prediction of resultant noise levels at NSRs to be undertaken and provide a good level of confidence in the likely noise contribution and to show that the noise limits can be achieved in practice. Section 7.5.1 provides details of the assumed plant noise levels, which is based on measured data from similar plant used on other UK Solar Farm sites.

8.5.28 In terms of the potential noise characteristics of the Solar Farm and Battery Energy Storage Compound plant, the following provides the details of the appropriate noise criteria applied in the assessment in accordance with BS4142: 2014+A1:2019.

##### Tonality

8.5.29 In terms of tonality, the plant that is likely to contain this type of characteristic (without mitigation) would be the transformers and any associated cooling fans for the inverter containers at close range positions. However, with proposed mitigation measures and separation distance from NSRs to the plant is likely to be sufficient to prevent any



perceptible tonal noise at NSRs. This opinion is supported by results of a number of Solar Farm facility noise surveys in the UK by the author of this chapter. It is therefore assumed that no tonal noise character penalty is required.

Impulsivity

8.5.30 In terms of impulsivity this is unlikely to be a characteristic of solar farms, battery storage and transformers installations and is therefore not deemed to be applicable.

Intermittency

8.5.31 In terms of intermittency the solar plant would tend to work for reasonable long periods of time once demand requires use of its power and by its nature it does not tend to operate intermittently. The battery storage plant would operate for short periods but continuously. The intermittency is therefore highly unlikely to be distinctive.

8.5.32 In conclusion, in view of the noise contribution from the site, residual sound levels and design approach to provide suitable mitigation measures, we would advise that a noise character penalty is not appropriate to add to the calculated noise contribution from the fixed plant

8.5.33 Tables 8.21 detail the predicted noise levels for the operation of the fixed plant all operating together on-site at full load. CadnaA noise modelling software has been used to calculate the resultant maximum noise levels.

**Table 8.22: Predicted Highest Likely Noise Level from Solar Farm Operations at NSRs During Daytime Operations: 0700-2300 hours (refer to Appendix 8.5 for noise mapping)**

NSR (Refer to Figure 7-2 to 7-4)	Rating <sup>1</sup> Noise Level from Solar Farm Operations LAeq1hr dB	Representative Background Level LA90 dB (Residual LAeq)	Noise Level Difference Background & Site LAeq1hr dB	Impact Significance	Increase in Residual LAeq dB
R1. Whitton Rosser (south)	26	36 (46)	-10	Negligible	0
R2. Amelia Trust Farm (south)	24	36 (46)	-12	Negligible	0
R3. Blacklands Farm (southeast)	32	45 (59)	-13	Negligible	0
R4. Redland (north)	31	45 (59)	-14	Negligible	0
R5. Whitewell (west)	25	36 (46)	-11	Negligible	0
R6. Ty-n-Coed (west)	28	36 (46)	-8	Negligible	0
R7. Whitewell (west)	26	36 (46)	-10	Negligible	0
R8. Whitewell (west)	27	36 (46)	-9	Negligible	0
R9. Brooklands	26	40 (49)	-14	Negligible	0

R10. Brook Lane	27	40 (49)	-13	Negligible	0
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<sup>1</sup>The solar farm is not expected to produce any noise character due to absolute noise levels compared with residual LAeq levels at NSRs. \*This residential development has been recently approved under planning ref. C16C132D and belongs to the landowner.

8.5.34 The above results show no significant levels of noise predicted for all the plant in operation at full load. The noise levels are well below the noise limit criteria according to BS4142:2014+A1:2019 and would therefore, result in a **negligible** impact magnitude and **neutral** level of effect (refer to **Table 8.12**) and therefore not considered significant in EIA terms.

8.5.35 In respect of the increase in residual (LAeq) levels the results show no increase (refer to **Table 8.13**) which results in a **negligible** impact and **neutral** level of effect and therefore not significant.

**Table 8.23: Predicted Highest Likely Noise Level from Solar Farm Operations at NSRs During Sunrise (i.e. 0430-0700 hours) and Night-time Operations (refer to Appendix 7.5 for noise mapping)**

NSR (Refer to Figure 7-2 to 7-4)	Rating <sup>1</sup> Maximum Noise Level from Solar Farm Operations LAeq15mins dB	Representative Background Level LA90 dB (Residual LAeq)	Noise Level Difference Background & Site LAeq15mins dB	Impact Significance According to BS4142:2019	Increase in Residual LAeq dB
R1. Whitton Rosser (south)	24 (night) 26 (sunrise)	26 (39) 30 (40)	-2 -4	Negligible Negligible	+0.2 +0.2
R2. Amelia Trust Farm (south)	23 24	25 (39) 28 (41)	-2 -4	Negligible Negligible	+0.1 +0.1
R3. Blacklands Farm (southeast)	32 32	34 (51) 34 (54)	-2 -2	Negligible Negligible	+0.1 0
R4. Redland (north)	31 31	34 (51) 34 (54)	-3 -3	Negligible Negligible	0 0
R5. Whitewell (west)	22 25	26 (36) 29 (35)	-4 -4	Negligible Negligible	+0.2 +0.4
R6. Ty-n-Coed (west)	26 28	26 (36) 29 (35)	0 -1	Negligible Negligible	+0.4 +0.8
R7. Whitewell (west)	22 26	26 (36) 29 (35)	-4 -3	Negligible Negligible	+0.2 +0.5
R8. Whitewell (west)	22 27	26 (36) 29 (35)	-4 -2	Negligible Negligible	+0.2 +0.6
R9. Brooklands	23 26	25 (39) 28 (41)	-2 -2	Negligible Negligible	+0.1 +0.1
R10. Brook Lane	23 27	25 (39) 28 (41)	-2 -1	Negligible Negligible	+0.1 +0.2

<sup>1</sup>The solar farm is not expected to produce any noise character due to absolute noise levels compared with residual LAeq levels at NSRs.

8.5.36 The above results show no significant levels of noise predicted for all the plant in operation at full load. The noise levels are well below the noise limit criteria according to BS4142:2014+A1:2019 and would therefore result in a **negligible** impact magnitude and **neutral** level of effect (refer to **Table 8.12**) and therefore not considered significant

in EIA terms.

- 8.5.37 In respect of the increase in residual (LAeq) levels the results show the increase ranges between no change to +0.8dB LAeq (refer to **Table 8.13**) which results in a **negligible** impact and **neutral** level of effect and therefore not significant.
- 8.5.38 The calculations use the methodology given in ISO9613-2. Under this methodology the sound power level of the noise source is defined, and the attenuation is calculated between its location and the selected receiver, taking account of distance, ground attenuation, screening and the time that a noise source would be operating.
- 8.5.39 The operational phase noise impacts from the Proposed Development are therefore not considered to represent a significant impact in EIA terms.

#### Ecological Receptors

- 8.5.40 Ecological sensitive areas (i.e. Sites of Importance for Nature Conservation SINC) are located in some limited areas to the northern, north-western, south-eastern and southwestern boundaries and a small Ancient Semi-natural Woodland at Brook Wood to the southeast. These are presented in **drg no. 9468-E-02B**.
- 8.5.41 The predicted noise levels during the construction phase at the closest boundary positions are likely to vary between 46dB and 69dB LAeq<sub>1hr</sub> which would be for a temporary and short-term peak period. This compares with typical residual levels of 46-49dB LAeq and the application of 'best practicable means' and the receptor of medium sensitivity, is not expected to be higher than a short-term **moderate** impact without mitigation and with mitigation these levels would be minimised and would therefore not produce a significant effect.

#### Cumulative Impact of Permitted Development

- 8.5.42 In terms of cumulative influences from beyond the application site boundary, the baseline sound survey would have included surrounding land-uses. Consideration has also been given to significant planning permissions (within 1km of the Site) that would generate noise, which have yet to become fully operational within the vicinity of the application site.
- 8.5.43 The potential permitted (but not built) development or proposed development includes the following:
- a) Planning permission 2022/01177/FUL relates to a proposed replacement primary school. This is located circa 800m north of the Proposed Development and at this point in time no work has yet started on this project. Due to the separation distance and intervening land topography there is no expected significant noise contribution or cumulative impacts to occur from the school construction works or operational activities.
  - b) An application for the erection and operation of a Solar Farm and Battery Storage Facility located circa 700m east of the Proposed Development at Redlands Farm (Viانشill Farm) has been submitted (planning ref. 2021/00110/OBS). The application is designated as a Development of National Significance and will require an EIA submission. The separation distance is such that the potential noise contribution is likely to be very low as the development has residential receptors along the western

boundary of the Vianshill Farm development and therefore the noise levels at this position will need to be low to comply with relevant guidance and standards. Due to the separation distance between the two Solar Farms at the closest approach, the contribution during construction and operational phases at the nearest receptor (R9) of the Proposed Development is expected to be low enough to ensure cumulative effects are not significant and the cumulative impact negligible at NSRs.

- 8.5.44 No other significant planning permissions which have yet to become fully operational within the vicinity of the site were identified.
- 8.5.45 The cumulative effect of the Proposed Development with other planned developments in the local area have been considered. It is concluded that there will be no cumulative environmental effects at NSRs arising from the identified developments during Site construction or operations.

## 8.6 ADDITIONAL MITIGATION Construction or Decommissioning Phase

- 8.6.1 In accordance with BS 5228, best practice would be employed to control the noise generation. In consideration of applying best practice, the following measures would be proposed:
- Restricting operation to current permitted hours during the daytime;
  - Regular maintenance of plant;
  - Where required, use of local screening where plant is being used in close proximity to sensitive receptor boundaries or around plant (e.g., within 50m of a sensitive boundary) using temporary hoarding; and
  - Site management.
- 8.6.2 The Local Authority is able to set out planning consent conditions to ensure that the noise criteria for daytime and night-time operations are achieved.
- 8.6.3 The predicted noise levels from the site have been calculated without any further noise mitigation measures, however the following proposed management control measures applies best available techniques to control airborne noise from site to minimise noise levels at nearest receptors.

### Site Management

- 8.6.4 The following measures would assist in minimising radiated noise from site:
- The use of a banksman to help guide deliveries into site;
  - Advisory temporary signage on the highway for works in the area;
  - Ensure deliveries follow agreed routes;
  - Provide sufficient parking areas so there is no parking on the highway or block access tracks;
  - Vehicles carrying loose material shall be sheeted;
  - The use of bowsers/sprays as necessary during dry conditions to prevent dust and the use of wheel cleaning facilities to prevent 'drag out' on the highway as required;

- Secure the site to prevent unauthorised access;
- Regularly monitor the condition of the highway for 'drag out' or damage and rectify as required;
- Contact local residents prior to construction works commencing advising of anticipated duration and a contact number to advise of any issues/concerns; and
- Turning engines off when not in use.
- All mobile plant operating on-site should be designed such that reverse alarm use is minimised.
- Where practicable, the mobile plant should be fitted with broadband noise type alarms (i.e. non
- 'beeper' type);
- Ensure drivers are instructed to minimise engine revving and avoid unnecessary impact noise;
- Ensure plant is regularly maintained and fitted with efficient exhaust silencers;
- Plant equipment should not have engine covers or hoods removed except for maintenance; and
- Introduce a complaints procedure and/or site liaison contact or committee for local residents so that they can be informed of site progress and to be able to make contact with site.

#### Vibration

- 8.6.5 The application of 'best practicable means' would ensure that vibration generated during the construction phase would be below the level of perceptibility. This may for example include:
- Selection of vibratory plant to minimise vibration.
  - Wherever practicable, ensure distance between NSR and compaction activity is greater than 30m.

#### Operational Phase

- 8.6.6 The incorporated mitigation measures described previously adequately address the needs to avoid, reduce and compensate for many of the potential effects of the Proposed Development and avoid any significant effects.

### 8.7 RESIDUAL EFFECTS & CONCLUSIONS

#### Construction or Decommissioning Phase

- 8.7.1 During the construction and decommissioning phases there would be a variety of noise sources in use at different stages and their associated activities would vary from day to day. The highest noise levels relative to nearest receptors are likely to occur during site preparation and infrastructure activities. The peak noise activities do not normally occur over long periods of time and best practical means would be employed to control the noise being generated. It is concluded that the increase in construction noise with the implementation of mitigation measures, using best practice, during peak noise

events, is likely to result in an impact magnitude classification of negligible to slight at receptors and a neutral to minor level of effect.

- 8.7.2 In terms of vibration during the temporary construction period, with the application of 'best practicable means' to control vibration, it is concluded that the impact from vibration with the implementation of mitigation measures would result in a negligible magnitude impact and a neutral level of effect at the nearest residential receptor and well within guidance limits for nuisance and cosmetic damage. The effect would not be significant.

**Road Traffic Noise**

- 8.7.3 The assessment of impact on existing residential areas from any increase in road traffic noise during the daytime construction / decommissioning stage of the Proposed Development shows no significant change in noise levels and therefore there is likely to be a **negligible** magnitude impact at receptors, resulting in a **neutral** level of effect. The effect would not be significant. During the operational phase the impact from road traffic noise would be **negligible** and a **neutral** level of effect.

**Operational Noise**

- 8.7.4 The assessment shows that there would be no significant impacts during the operation of the Proposed Development following the implementation of appropriate mitigation.

**Cumulative Effects**

- 8.7.5 The cumulative effect of other developments in the local area that have planning permission or have not been determined have been considered. It is concluded that there will be no cumulative environmental effects at residential receptors arising from the Proposed Development in combination with the identified developments during either the construction or operational phases.

**Grid Connection**

- 8.7.6 The effect of the construction work involved in providing a grid connection for the proposed development have been considered. The grid connection is within the site boundary and in a relatively central position. Based on the highest likely noise and vibration levels from plant required to excavate and infill the trenchwork from the associated plant, it is concluded that the environmental effects arising from the temporary and short-term works would be **negligible** impact and **neutral** effect, which is not significant.
- 8.7.7 In summary, no significant noise or vibration effects have been identified by the noise assessment in relation to construction or operation of the Proposed Development. **Table 8.23** below summarises the predicted residual effects of the construction / decommissioning, and operation of the Proposed Development.

**Table 8.24: Residual Impact at Nearest Receptor after Mitigation Measures**

Source	Nature of Effect	Time Period	Effect	Proposed Mitigation	Residual Effect	Residual Impact Magnitude

Construction /Decommissioning noise	Direct & Temporary	Daytime	Neutral to Slight	CEMP	Neutral to Minor	Negligible to Slight
Road traffic noise (construction/ decommissioning)	Direct & Temporary	Daytime	Neutral	Inherent traffic routes	Neutral	Negligible
Road traffic noise (operation)	Direct & Permanent	Daytime	Neutral	Inherent traffic routes	Neutral	Negligible
Industrial noise (operation)	Direct & Permanent	Daytime Night	Neutral Neutral	Design & mitigation	Neutral Neutral	Negligible Negligible
Construction/ Decommissioning Vibration	Direct & Temporary	Daytime	Neutral	CEMP	Neutral	Negligible
Operational Vibration	Direct & Permanent	Daytime Night	Neutral Neutral	None required	Neutral Neutral	Negligible Negligible
Road traffic vibration	Direct & Permanent	Daytime	Neutral	None required	Neutral	Negligible
Cumulative Effects	Direct & Permanent	Daytime	Neutral	None	Neutral	Negligible
Grid Connection	Direct & Temporary	Daytime	Neutral	CEMP	Neutral	Negligible

## 8.8 SUMMARY

8.8.1 Noise and vibration levels have been considered and assessed during the construction / decommissioning and operational phases of the proposed Solar Farm and Battery Energy Storage System. Relevant and appropriate noise and vibration guidance and standards have been used to determine the impact. The assessment has been undertaken to inform and guide the design of the proposed development, such that any likely noise and vibration impact on existing and potential sensitive receptors is minimised.

8.8.2 To establish any likely impact from noise a detailed assessment of baseline sound levels has been considered by undertaking fixed position noise monitoring at four noise

sensitive receptor areas around the Site. This was carried out over a weekday and weekend period in November 2021 to establish the lowest likely representative background levels for robustness.

- 8.8.3 The Environmental Health Team at Vale of Glamorgan Council has been formally consulted to seek advice and reach agreement in respect of baseline survey methodology, assessment methodology and receptor locations.
- 8.8.4 In accordance with appropriate standards, best practical means would be employed to control the noise generation during the construction period. Measures may include restriction on operating hours, sensible routing of equipment to site and careful choice of piling rigs to minimise noise. Such measures would be defined within the Construction Environmental Management Plan.
- 8.8.5 The assessment shows that there would be no significant impacts during the construction or operation of the Proposed Development following the implementation of appropriate mitigation.





## 9. HISTORIC ENVIRONMENT

## 9.1 INTRODUCTION

- 9.1.1 This chapter has been prepared by Dr Susan Stratton and Rachel Willmot of Archaeology Wales (AW).
- 9.1.2 This chapter of the Environmental Statement (ES) assesses the likely significance of the effects of the Proposed Development on the environment with respect to archaeology and heritage.
- 9.1.3 The Assessment has collated details of the known archaeological and historic sites and features and considered the potential for the presence of unknown or unrecorded heritage assets.
- 9.1.4 The Assessment considers the potential significant effects of the Proposed Development on all these heritage assets, including archaeological sites, features and artefacts, historic buildings and historic landscapes. Both potential 'direct' and 'indirect' effects on the historic environment are considered. Where likely significant adverse effects are identified, mitigation measures to prevent, reduce, or offset them are proposed, and likely residual effects remaining after mitigation are determined.

## 9.2 CONTEXT Terminology

- 9.2.1 In assessing the value of archaeological assets, and the potential impacts upon them by the proposed development, the terms and guidance used in the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3 (Highways England 2007) has been utilised. The DMRB is the established good practice guidance for assessing the impact of the effects of the Proposed Development on the cultural heritage resource, which it divides into three sub-topics: Archaeological Remains, Historic Buildings and Historic Landscapes (Annexes 5-7).
- 9.2.2 **Archaeological Remains** are the materials created or modified by past human activities that contribute to the study and understanding of past human societies and behaviour. Archaeology can include the study of a wide range of artefacts, field monuments, structures and landscape features, both visible and buried. For the purposes of the DMRB guidance, the sub-topic generally excludes historic buildings and historic landscapes, always accepting there may be important archaeological aspects to these sub-topics.
- 9.2.3 **Historic Buildings** are architectural or designed or other structures with a significant historical value. These may include structures that have no aesthetic appeal, and the sub-topic includes, in addition to great houses, churches and vernacular buildings, some relatively modern structures, such as WWII and Cold War military structures, early motorway service stations, industrial buildings, and sometimes other structures not usually thought of as 'buildings', such as milestones or bridges.
- 9.2.4 **Historic Landscapes** are defined by perceptions that emphasise the evidence of the past and its significance in shaping the present landscape. The definition encompasses all landscapes, including the countryside, townscapes and industrial landscapes as well as designed landscapes, such as gardens and parks. As the whole of the UK's (and most of the world's) landscape has been modified by past human activities, it all has an historic character. However, just as all old materials are not necessarily archaeologically significant merely by virtue of their age, so not all

landscapes are equally historically significant.

9.2.5 The value or sensitivity of a receptor is categorised using its designation and importance internationally, nationally, regionally, or locally. These are scored using professional judgement guided by legislation, policy and acknowledged standards. The value of the assets within these three sub-topics: **Archaeological Remains**, **Historic Buildings** and **Historic Landscapes** are identified in the DMRB Annexes 5-7 (Tables 5.1, 6.1 and 7.1). The values applied in this assessment are listed below:

- **Very High** World Heritage Sites and other sites of international importance
- **High** Scheduled Monuments, undesignated assets of schedulable quality, assets of national importance that can contribute significantly to acknowledged national research objectives;
- **Medium** Designated or undesignated assets of regional importance that contribute to regional research objectives;
- **Low** Assets of local importance, assets compromised by poor preservation or poor survival of contextual associations;
- **Negligible** Assets with little or no surviving archaeological interest;
- **Unknown** The importance of the resource has not been ascertained.

9.2.6 Magnitude of effect is also assessed using the guidelines set out in the DMRB (Annexes 5-7 (Tables 5.3, 6.3 and 7.3). This assessment is made without regard to the value of the resource, so the total destruction of a low value site is considered as the same magnitude of effect as the destruction of a high value asset. The effect can be either 'direct' or 'indirect'. A direct effect is where there is a physical impact on a heritage asset, typically during the construction phase. Indirect is when there is a visual effect on the asset or its setting. In the broadest terms, the setting of an asset comprises the objects and conditions around it, and within which it is perceived; and in this sense all assets have settings. Not all settings, however, contribute to the value of the assets they encompass. The setting will be a combination of views, other historic features and their relationships to the asset, ambience (topography, vegetation, sound, and other sensual experiences) and context (what is known or thought about the asset, but not immediately experienced through the senses). The magnitude indicators applied in this assessment are listed below:

- **Major** Change to most or all key archaeological materials, such that the resource is totally altered; comprehensive changes to setting;
- **Moderate** Changes to many key archaeological materials, such that the resource is clearly modified; considerable changes to setting that affect the character of the asset;
- **Minor** Changes to key archaeological materials, such that the asset is slightly altered; slight changes to setting;
- **Negligible** Very minor changes to archaeological materials, or setting;
- **No Change.**

9.2.7 The impact could be permanent or temporary in nature:

- Permanent impacts are where recovery is not possible within a

reasonable timescale or where mitigation measures cannot reverse it. This type of impact typically comprises of loss of archaeological features, the effects of which are mitigated by means of on-site recording, change of design, etc.

- Temporary impacts are where recovery is possible naturally over a short period of time or where mitigation measures can be effective at reversing the impact. These impacts typically comprise of visual or other indirect effects but can also include other impacts such as a change of historic land-use. Temporary impacts typically can be reversible if required, although this is not always the case.

9.2.8 Impact timescales are based on the following:

- Short-term 0-5 years (typically construction impacts)
- Medium-term 5-20 years
- Long-term 20 years +

9.2.9 Significance of effect is assessed by combining the value of the resource and the predicted magnitude of effect likely to arise, as per the matrix within the DMRB (Vol.II, Sect.3, Pt.2, Chap.5 – Table 5.1). The following table outlines the significance matrix used in this assessment to assign significance, as per the DMRB guidelines.

**Table 9.1: Significant Matrix**

		Magnitude of Impact (degree of change)				
		No change	Negligible	Minor	Moderate	Major
Environmental Value (Sensitivity)	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or Moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

9.2.10 For the purposes of the EIA, only moderate, moderate/large, large/very large or very large effects are considered significant.

**Legislation and Policy**

9.2.11 National Policies relating to archaeology and cultural heritage include the following:

- Ancient Monuments and Archaeological Areas Act 1979;
- Planning (Listed Buildings and Conservation Areas) Act 1990
- Planning Policy Wales (Edition 11, 2021), Section 6;
- Technical Advice Note (TAN) 24: The Historic Environment, 2017

9.2.12 Policies relating to cultural heritage within the LDP include:

- Policy MD8 - Historic Environment; and
- Policy SP10 - Built and Natural Environment

### 9.3 ASSESSMENT APPROACH

#### Sources of Information

9.3.1 This ES chapter has been informed by the following documents:

- Standard and Guidance for Historic Environment Desk-Based Assessment, published by the Chartered Institute for Archaeologists (CIfA; October 2020)
- Research Framework for the Archaeology of Wales, 2017, A Research Framework for the Archaeology of Wales: Final Paper
- Cadw, CCW & ICOMOS. 1998. The Register of Landscapes of Outstanding Historic Interest in Wales
- DMRB, Volume 11 Environmental Assessment, Section 3 Environmental Topics, Part 2, Cultural Heritage), which is published by the UK Government on behalf of the Highways Agency, Transport Scotland, Welsh Assembly Government (Llywodraeth Cynulliad Cymru) and the Department for Regional Development Northern Ireland.

#### Methodology

9.3.2 The primary objective is to assess the impact of the development proposals on the historic environment. The aim is to make full and effective use of existing information in establishing the archaeological significance of the Application Site, to elucidate the presence or absence of archaeological material, its character, distribution, extent, condition and relative significance.

9.3.3 A Desk Based Assessment (DBA) was undertaken by Archaeology Wales in 2020 and updated in 2022 (Appendix I), the results of which have been used to help inform this ES chapter. Historic environment data was collected within a minimum study area of 1km of the proposed development site and designated archaeological site data was collected from within a 3km radius. This area was considered to provide sufficient contextual information from which to assess archaeological potential within the vicinity of the development and potential impact of the development on the archaeological resource.

9.3.4 The following sources of archaeological and historical information were consulted as part of the preparation of the DBA completed in 2022:

- Collation and assessment of all relevant information held in the regional HER at the Glamorgan-Gwent Archaeological Trust, within a 1km buffer zone around the proposed development area.
- Collation and assessment of the impact on all Designated archaeological sites (Scheduled Ancient Monuments, Listed Buildings, Historic Parks & Gardens, landscapes, Conservation Areas) within 3km buffer zone around the proposed development area.
- Assessment of all available excavation reports and archives including unpublished and unprocessed material affecting the site and its setting.

- Assessment of aerial photographic (AP) and satellite imagery evidence.
- Assessment of archive records held at the County Archive, the National Library of Wales (NLW) and the Royal Commission on Ancient and Historical Monuments in Wales (RCAHMW).
- Records held by the developer e.g., bore-hole logs, geological/geomorphological information, aerial photographs, maps, plans.
- Map regression analysis using all relevant cartographic sources e.g., all editions of the Ordnance Survey County Series, Tithe, and early estate maps (as available).
- Place-name evidence.
- Historic documents (e.g., charters, registers, estate papers).
- LIDAR Data;
- Online sources: British Geological Survey (BGS), additional historic mapping providers;
- Site Visit

9.3.5 This includes details of the initial data gathering undertaken for the scoping exercise and how this has influenced the scope of the assessment.

## 9.4 BASELINE CONDITIONS

### Previous Archaeological Studies

9.4.1 Studies undertaken in association with the proposed development include a Desk-Based Assessment (DBA) originally compiled in 2020 and revised and updated in 2022 (Archaeology Wales 2022, Appendix I). The DBA identified 136 previously recorded sites of archaeological interest including eight Scheduled Monuments and ten Listed Buildings within 1km of the development. The assessment determined that 14 of these sites are located within the proposed development area.

9.4.2 Two of these sites comprised cropmarks of an enclosure and field system within Area 1 (GGAT03998s; NPRN 309275 & NPRN 309284). This assessment identified three new sites of archaeological interest within Area 1: a structure (OFV01), an old quarry/limekiln (OFV02), and a further old quarry (OFV03). However, subsequent studies of historic mapping, aerial photography and a site visit established that OFV03 was outside the development area. The remaining previously recorded sites are located within Area 2, and these are made up of industrial and agricultural post-medieval sites.

9.4.3 Following the DBA, consultation with GGAT-APM highlighted an unpublished excavation to the south of the proposed development which would increase the likelihood of encountering archaeological activity in the area.

9.4.4 To the south of the proposed development area, improvement works to the A4226 (Five Mile Lane) picked up a range of archaeological features during a geophysical survey (GSB Prospection, 2015). Subsequent excavations revealed extensive archaeological evidence dating from the prehistoric onwards. This included a Roman villa site, prehistoric circular enclosures, field systems and over 450 inhumations or cremations (Rubicon Heritage, forthcoming).

- 9.4.5 As part of initial investigations, a geophysical survey was undertaken by AW on the development site (Thomas, 2021, Appendix II). The survey results indicated the possible presence of buried archaeological features across the site, which included evidence of more recent field boundaries and historic agricultural practice.
- 9.4.6 In Development Area 1, the geophysical survey identified numerous elements of potential archaeological interest, including linear anomalies and a possible curvilinear feature. In the southern part of Area 1, a possible prehistoric burnt mound was identified, and two curved bands were noted in the east.
- 9.4.7 Within Development Area 2, the geophysical survey identified linear anomalies across multiple fields. There was also a curved shape of magnetic material approximately 200m long with six magnetic responses to its north. In addition, a roughly circular strong positive response anomaly was identified which had corresponding negative responses around the interior and exterior. It is possible that this is non-archaeological in nature as there are three dipolar responses running east to west above this anomaly.
- 9.4.8 In Development Area 3, a number of features were identified as holding potential archaeological interest. This included linear anomalies, two curvilinear features, a wide band of possible thermoremanent material, and two areas of strong magnetic disturbances. In addition, six irregular shaped features ranging in size from 6m–24m, a curvilinear and a large circular area of possible thermoremanent material, four sub-circular features of a similar size and a single curvilinear feature were seen.
- 9.4.9 In early 2022 AW carried out a field evaluation comprising 52 trenches across all three areas (Appendix III). The results of the evaluation revealed a number of areas of archaeological potential. The first is the eastern part of Area 1 with a concentration of potential archaeological features centred on a square, bivallate probable farmstead enclosure of likely Iron Age or Roman date. This is set amongst other linear features, possibly describing square and rectangular enclosed areas. These are in the same alignments as the farmstead and therefore likely associated with it. Towards the western part of Area 1, a cremation urn burial pit was excavated. As a result of this discovery, this trench was extended (40mx40m), however no further archaeological features or further burials positively linked to the cremation were revealed.

#### Site, Monument, Building and Landscape Designations

- 9.4.10 In order to assess the historic environment, Scheduled Monuments (SMs), Historic Parks and Gardens, Registered Historic Landscapes, Conservation Areas, and Listed Buildings were examined within 2km around the proposed development to assess the impact on these assets.
- 9.4.11 The proposed site is not located within any Conservation Area or Registered Park and Garden. The Registered Historic Landscape of Llancarfan (HLW (SG) 1) is partially located within the western extent of Area 1 of the proposed development site. This landscape is separated into twelve Historic Landscape Characterisation Areas (HLCAs), and the site is located within HLCA 010 Bonvilston Amalgamated Fieldscape.
- 9.4.12 In the wider landscape, there are four Registered Historic Park and Gardens located within the 3km study area; Dyffryn Gardens (GM32), Llantrithyd Place (GM43), Coedarhydyglyn (GM40), and Wenvoe Castle (GM33) as well as six Conservation

Areas; Bonvilston, Llanccarfan, Llantrithyd, Peterston-Super-Ely, St Nicholas, and Drope.

- 9.4.13 Scheduled Monuments are sites considered to be of national importance and have statutory protection under the Ancient Monuments and Archaeological Areas Act 1979. No Scheduled Monument lie within the boundary of the proposed development area, but there are twenty-two Scheduled Monument within the 3km study area. The nearest being Castle Ringwork 850m ENE of Ty'n-y-Coed (GM613) which is c. 42m north-east of Area 1's northern boundary, Coed y Cwm Ringwork (GM117) is located c. 10m north of Area 2 and approximately 200m north-east of Area B is the Coed-y-Cwm Chambered Cairn (GM116).
- 9.4.14 No Listed Buildings lie within the proposed development area, however, there are 72 Listed Buildings within the 3km study area, these include two Grade I, eight Grade II\* and 62 Grade II Listed Buildings.
- 9.4.15 As noted above, fourteen specific recorded sites of archaeological interest were identified as a part of the DBA within the proposed development boundary.

## 9.5 ASSESSMENT OF EFFECTS

### Sources of Potential Effects

- 9.5.1 Any of the following activities associated with the proposed development could potentially expose, damage, or destroy archaeological remains:
- Surface stripping and levelling;
  - Construction of associated infrastructure;
  - Service installation;
  - Any other ground disturbing works

### Archaeological Remains

- 9.5.2 The Registered Historic Landscape of Llanccarfan (HLW (SG) 1) will be directly and indirectly affected by the proposed development. The western extent of the development site lies within the Registered Historic Landscape and any construction within it will create a direct impact on Historic Landscape Character Area 010 Bonvilston Amalgamated Fieldscape and will have an indirect (visual) impact on the remainder of the landscape. The significance of the impact, as assessed in Appendix IV- ASIDOHL Study, on the HLCAs is summarised in **Table 9.2** below.

**Table 9.2: Impact Significance on HLCAs**

HLCA	Overall Significance of Impact
HLCA 008 – Middle Llanccarfan Valley	12 – Moderate
HLCA 009 – Greendown	5 – Slight
HLCA 010 – Bonvilston Amalgamated Fieldscape	20 – Fairly Severe
HLCA 011 – Liege Castle	15 – Moderate
HLCA 012 – Ty'n-y-Coed	9 – Slight



- 9.5.3 There are no Listed Buildings within the proposed development area. There is very limited intervisibility between the listed buildings situated within the conservation areas: Bonvilston, Llancarfan, Llantrithyd, Peterston-Super-Ely, St Nicholas, and Drope, and the proposed development site. Therefore, the indirect impact of the proposed development on the setting these buildings is deemed to be **Minor** and the significance **Slight**. The indirect impact to the remaining 72 Listed Buildings (LBs) within a 3km study area is deemed to be **Negligible** and the significance is **Slight**. The magnitude of the impact will be similar during all phases of construction, use and decommission. The proposed development will not trigger any direct or indirect impact after the decommission of the solar farm.
- 9.5.4 No Scheduled Monument (SM) will be directly affected by the proposed development. Three SMs will be indirectly (visually) affected by the proposed development due to the distance the monuments are situated. Castle Ringwork 850m ENE of Ty'n-y-Coed (GM613) is only c. 42m north-east of Development Area 1's northern boundary, and it is clearly visible from the northern area of this section of the site. Therefore, the potential indirect impact will be **Moderate**. Similarly, Coed y Cwm Ringwork (GM117) is only c. 10m from the northern boundary of Development Area 2 and is clearly visible from the north-eastern area of Development Area 2. Therefore, the potential indirect impact will be **Moderate**. The significance according to the matrix is assessed to be **Moderate**.
- 9.5.5 Castell Moel hillfort (GM298) is also visible from site, but it is at some distance away (850m) and the potential indirect impact on this SM will be **Minor**. The significance is therefore **Slight**. The other SMs, including Coed-y-Cwm Chambered Cairn (GM116) and Tinkinswood Burial Chamber (GM009), which are both within 500m of the development area, are protected from view by the topography. Therefore, the potential impact on these will be **No Change**.
- 9.5.6 Non-designated assets may be directly affected by the proposed development area. Fourteen specific recorded sites of archaeological interest were identified within the proposed development boundary, alongside OFV01 and OFV02 identified during the desk-based assessment. The value, magnitude of impact and the resulting significance of effect is summarised in **Table 9.3** below.

**Table 9.3: Impact on Non-Designated Assets**

ID	Value	Magnitude of Impact	Significance
GGAT03873s	Low	Negligible	Neutral
GGAT03874s	Low	Minor	Neutral
GGAT03877s	Low	Minor	Neutral
NPRN 15270	Low	Negligible	Neutral

GGAT03884s	Low	Negligible	Neutral
GGAT03879s	Low	Negligible	Neutral
GGAT03880s	Low	Negligible	Neutral
GGAT03881s	Low	Negligible	Neutral
NPRN 414419	Low	Negligible	Neutral
GGAT03878s	Low	Minor	Neutral
NPRN 422326	Low	Moderate	Slight
GGAT03872s	Low	Minor	Neutral
NPRN 309275	Medium	Moderate	Moderate
GGAT03998s; NPRN 309284	Medium	Minor	Slight
OFV01	Low	Minor	Slight
OFV02	Low	Minor	Slight

9.5.7 The field evaluation targeted the cropmark enclosure which produced evidence of Roman date for the feature. This feature is of **Medium** archaeological value, and development on this site may have a **Moderate** direct impact upon it. The magnitude of the impact will be similar during all phases of construction, use and decommission. The proposed development will not produce any impact after the decommission of the solar farm.

9.5.8 There is potential that further evidence could be revealed as a result of groundworks in the undisturbed areas of the proposed development site including, but not limited to, sites associated with the cremation burial pit which was revealed during the evaluation works. The impact is currently **Unknown**, which means significance cannot be assigned at this time.

## 9.6 PROPOSED MITIGATION

### Registered Landscapes

9.6.1 It is recommended that the potential direct and visual impacts on the Registered Historic Landscape of Lancarfan should be taken into consideration during the creation of the final design scheme. To minimise the direct impacts on the landscape, construction and any ground disturbance works should be kept to a minimum in this area. To mitigate any visual indirect impacts upon the landscape current field and wooded boundaries should be maintained.

### Schedule Monuments

9.6.2 To mitigate the indirect visual impacts of the designated assets, the final design scheme should maintain current treelines and vegetation, and possibly create more to shield the assets from the proposed development. This is particularly relevant for Coed y Cwm Ringwork (GM117) and Castle Ringwork 850m ENE of Ty'n-y-Coed (GM613) as they are likely to be the most affected designated assets.

### Conservation Areas

9.6.3 In the case of Bonvilston conservation area, no mitigation is required both during the construction and decommissioning phase. The impact on Bonvilston conservation area will be mitigated by excluding certain areas that are topographically higher from the

project design, for example: the entrance to the site, eastern and northern edges.

#### Listed Buildings

- 9.6.4 No mitigation is required in regard to listed buildings (LBs) within the assessment area.

#### Non-designated Assets

- 9.6.5 It was recommended within the original desk-based assessment, that a geophysical survey would serve as an appropriate 'Stage 1' mitigation to investigate the archaeological potential of the area. This was undertaken in late 2021 producing a number of anomalies which had the potential to be archaeological in nature (Appendix II). Subsequently, following discussions with GGAT-APM, a field evaluation was carried out comprising the excavations of 52 trenches across all areas of the proposed development (Appendix III). Development Area 1 had a number of archaeological features including further evidence of the cropmark enclosure GGAT03998s; NPRN 309275 as well as a Bronze Age cremation urn within a burial pit. Recommended mitigation following this comprises a Strip, Map and Excavate of the area encompassing the enclosure and an archaeological watching brief on all ground penetrating works (not including the pilling works).

## 9.7 SUMMARY OF PREDICTED EFFECTS

**Table 9.4: Predicted Effects**

Heritage Asset	Value	Nature of Potential Impact	Magnitude of Potential Impact	Level of Effect	Phase	Mitigation	Residual Effect Following Mitigation
Registered Historic Landscape of Lancafarn	High	Direct- removal of key characteristics Indirect- Change in Setting	Moderate	Large	Construction and Operational	Retention of the field system including its current boundaries, Maintain current treelines and vegetation	Moderate Adverse
Conservation Areas Including the listed buildings within	High	Indirect- Change in Setting	Minor	Slight	Operational	Maintain current treelines and vegetation	Neutral
Listed Buildings outside of the Conservation Areas	High	Indirect- Change in Setting	Negligible	Slight	Operational	Maintain current treelines and vegetation	Neutral
Coedy Cwm Ringwork (GM117)	High	Indirect- Change in Setting	Moderate	Moderate	Operational	Maintain current treelines and vegetation	Slight Adverse
Castle Ringwork 850m ENE of Ty'n-y-Coed (GM613)	High	Indirect-Change in Setting	Moderate	Moderate	Operational	Maintain current treelines and vegetation	Slight Adverse
Castell Moel hillfort (GM298)	High	Indirect-Change in Setting	Minor	Slight	Operational	Maintain current treelines and vegetation	Neutral
Enclosure GGAT03998s; NPRN 309275	Medium	Direct – Removal archaeological remains	Moderate	Moderate	Construction	Geophysical Survey and Evaluation (completed) Strip, Map and Excavate watching Brief	Neutral
Field system (NPRN 309284)	Medium	Direct – Removal archaeological remains	Minor	Slight	Construction	Retaining field boundaries and maintaining current treelines and vegetation	Neutral

Heritage Asset	Value	Nature of Potential Impact	Magnitude of Potential Impact	Level of Effect	Phase	Mitigation	Residual Effect Following Mitigation
Building remains (OFV01) and limekiln/quarry (OFV02)	Low	Direct – Removal archaeological remains	Minor	Slight	Construction	Geophysical Survey and Evaluation (completed) Strip, Map and Excavate watching Brief	Neutral
NPRN 422326	Low	Direct – Removal archaeological remains	Moderate	Slight	Construction	Archaeological Watching Brief	Neutral
GGAT03873s, NPRN 15270 GGAT03884s GGAT03879s GGAT03880s GGAT03881s NPRN 414419	Low	Direct – Removal archaeological remains	Negligible	Neutral	Construction	Archaeological Watching Brief	Neutral
GGAT03874s GGAT03877s GGAT03878s GGAT03872s	Low	Direct – Removal archaeological remains	Minor	Neutral	Construction	Archaeological Watching Brief	Neutral

## 9.8 IMPLEMENTATION OF MITIGATION

9.8.1 The mitigation required for this project involves the exclusion of vegetation, field patterns, boundaries, and treeline areas from development in order to protect the character of the Registered Historic Landscape of Llancarfan (HLW (SG) 1) and other designated assets. Much of the proposed mitigation has been implemented at the design stage. To mitigate the effect of the development on the buried archaeological resource an agreed programme of Strip, Map and Excavate would be carried out in advance of the groundworks and pilling. Areas of open trenching and stripping for the substation compound would be monitored by an archaeological watching brief.

## 9.9 RESIDUAL IMPACTS

9.9.1 A residual impact to the Registered Landscape includes the temporary disturbance of historic land-use and setting of the Landscape are expected however should be minimal and temporary in nature. There could potentially be a slight impact to the setting of the Scheduled Monuments, but again this would be minimal following appropriate mitigation. No further residual impacts are expected as a result of this development.

## 9.10 SUMMARY AND CONCLUSIONS

### Summary

9.10.1 There are potential direct and indirect impacts on the Registered Historic Landscape of Llancarfan which is assessed as having a High value, the significance of the impact, following an ASIDOHL Study (Appendix IV) is considered to be Slight for HLCA 009 and HLCA 012, Moderate for HLCA 008 and HLCA 011, and the impact on HLCA 010 is Large. This, however, can be moderated with the appropriate mitigation.

9.10.2 In the case of Bonvilston conservation area, no mitigation is required both during the construction and decommissioning phase. The impact on Bonvilston conservation area will be mitigated by excluding certain areas that are topographically higher from the project design, for example: the entrance to the site, eastern and northern edges.

9.10.3 During the initial investigations, number of archaeological features were exposed including further evidence of the cropmark enclosure GGAT03998s; NPRN 309275 as well as a Bronze Age cremation urn within a burial pit. Recommended mitigation following this comprises a Strip, Map and Excavate of the area encompassing the enclosure and an archaeological watching brief on all ground penetrating works (not including the pilling) within the development area.


9.10.4 Visual impact is likely in relation to the two Scheduled Monuments: Castle Ringwork (GM613) and similarly, Coed y Cwm Ringwork (GM117) within Landscape of Llancarfan (HLW (SG) 1) however with appropriate mitigation this should be Slight.

9.10.5 All other heritage assets within the assessment area are deemed to have no or negligible potential for impact.

### Conclusion

9.10.6 Assessment of the proposed development at Oaklands Solar Farm, Vale of Glamorgan has shown that the majority of the potential effects of the development are **Slight** or **Moderate** in significance which can be further reduced with appropriate mitigation. The only impact with a significant effect is that on the Registered Historic Landscape

of Llancarfan (HLW (SG) 1). The results of the ASIDOHL Study concluded a Significant Impact on HLCA 010 and a potentially Significant visual impact on HLCA 011, however it should be taken into account the reversibility of certain impacts of the development.



## **10. HYDRDROLOGY AND FLOOD CONSEQUENCES**



## 10.1 INTRODUCTION

- 10.1.1 This chapter sets out the assessment of the environmental impacts of the proposed development relating to hydrology, drainage and flood risk. It describes the baseline conditions, identifies key water resources and sensitivities, and assesses the direct and indirect impacts of the development on the hydrological environment. This chapter also assesses the potential for flood risk in accordance with Welsh Government guidance and the requirements of Natural Resources Wales (NRW). The need for any water resource mitigation measures is addressed and any post-mitigation residual impacts are identified.
- 10.1.2 A Flood Consequence Assessment (FCA) has been undertaken in accordance with CIRIA 624, Planning Policy Wales (PPW) (Edition 11) and the accompanying Technical Advice Note 15: Development and Flood Risk (TAN15). A FCA is required for less vulnerable development proposals in Flood Zones C1 and C2 that meet the justification test. A copy of the FCA is included in Appendix 10.1 to this ES.
- 10.1.3 The FCA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed, taking climate change into account. The FCA should identify opportunities to reduce the probability and consequences of flooding.

### Statement of Competence

- 10.1.4 This chapter and accompanying FCA (**Appendix 10.1**, Doc Ref. 4.01.10) was written by Keelan Serjeant BSc (Hons), MSc, MCIWEM who has over 17 years of experience in hydrology, flood risk and the planning process. He is a member of the British Hydrological Society and a Member of the Chartered Institute of Water and Environmental Management (CIWEM). He has written more than 1,000 Flood Risk Assessments and Environmental Statements and has taken training courses in the Flood Estimation Handbook (FEH), Urban Hydrology, SuDS, FRAs, water quality and planning. He has successfully delivered both site and strategic assessments for a range of private and public sector clients nationwide including developers, planning consultants, architects, private individuals, local planning authorities and the Environment Agency.

## 10.2 CONTEXT

### Legislation

- 10.2.1 There is a wide range of legislation associated with drainage and hydrological impact that apply in the UK. The legislation includes:
- Water Industry Act (1991)
- 10.2.2 The Water Industry Act relates to the supply of water and the provision of sewerage services and applies to all Sewerage Undertakers.
- Water Resources Act (1991 as amended)
- 10.2.3 The Water Resources Act relates to the National Rivers Authority, whose activities are now assumed by the Environment Agency (now Natural Resources Wales (NRW) in Wales) and sets out the responsibilities of NRW in relation to water pollution, resource management, flood defence, fisheries, and in some areas, navigation. The Act regulates activities that may affect the water environment. Discharge to controlled

waters is only permitted with the consent of NRW. An aim of the Act is to ensure that the polluter pays the cost of the consequences of their discharges.

Land Drainage Act (1991)

- 10.2.4 The Land Drainage Act outlines the constitution of Internal Drainage Boards (IDB) and the powers of the National Rivers Authority (now assumed by NRW). It also includes a definition of watercourses; all rivers and streams and all ditches, drains, culverts, dykes, sewers (other than public sewers) and passages through which water flows.

The EU Water Framework Directive (WFD) (2000)

- 10.2.5 WFD has been the cornerstone legislation in the EU and UK planning policy. The aim of the Directive is to generate a more integrated approach to water management ensuring that where possible links with ecology are increased. It also strives to ensure that water quality is improved and that any proposed developments will not have a detrimental impact upon water quality. The WFD was transposed into English & Welsh law via The Water Environment (Water Framework Directive) (England & Wales) Regulations 2003. The purpose of these regulations is to implement a strategic planning process to be established for managing, protecting and improving the quality of water resources within defined river basin catchment areas.

Water Act (2003)

- 10.2.6 The Water Act is an act whose provisions are mainly to amend other legislation, such as the Reservoirs Act 1975, Water Industry Act 1991 and the Water Resources Act 1991.

Flood Risk Regulations (2009)

- 10.2.7 The Flood Risk Regulations transpose the EC Floods Directive into domestic law and implement its provisions.

Water Framework Directive (2000)

- 10.2.8 The European Water Framework Directive was transposed into UK law in December 2003, as the Water Environment Regulations 2003. The framework commits the UK Government (and all other European Union members) to improving the quality of all water bodies and coastal waters such that they attain at least 'Good' status for chemical and ecological criteria.
- 10.2.9 Any modification to a waterbody and its floodplain is now required to be Water Framework Directive (WFD) compliant. Assessments should be undertaken to determine the impacts on interventions within a waterbody on the designated Ecological Status of that waterbody. All water bodies have to achieve a Good Ecological Status or Good Ecological Potential (for heavily modified water bodies) by 2027. Some water bodies have targets to reach a Good Status by either 2015 or 2021.
- 10.2.10 The act puts a duty on local authorities to take into consideration the aims and objectives of the act and any relevant River Basin Management Plan during the completion of their duties and to ensure no adverse effect upon the environment.

European Floods Directive (2007)

- 10.2.11 The aim of the European Floods Directive is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The

directive sets out requirements for the UK Government (and all other European Union members) to assess and map flood risk from all major rivers. Preliminary Flood Risk Assessments (PFRAs) have been produced by all Lead Local Flood Authorities, with the flood mapping stage completed by 2013. By 2015, Flood Management Plans will need to be produced, focussing on flood prevention, protection and preparedness. The EU Floods Directive has been transposed into UK law in the Flood Risk Regulations (2009).

### Planning Policy

- 10.2.12 Planning Policy Wales (PPW) 11 (February 2021) objective to support sustainable development is for the 'avoidance of development in areas of flooding from the sea or from rivers'. Local Planning authorities are advised to take a precautionary approach on a strategic scale which requires consideration of the catchment as a whole. Development proposals need to decrease not increase flood risk arising from fluvial or coastal flooding or from additional run-off created by new developments.
- 10.2.13 PPW11 considers flood risk to developments using a sequential characterisation of risk. This is presented in the TAN15 Development Advice Maps (DAMs) which identify flood zones A, B, C1 and C2. The initial study requirement is to identify the flood zones and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions.
- 10.2.14 A revised TAN15 is due to be implemented in June 2023. This will be supported by the new Flood Map for Planning, which includes climate change information to show how this will affect flood risk extents over the next century. It shows the potential extent of flooding assuming no defences are in place.
- 10.2.15 TAN15 requires a detailed Flood Consequence Assessment (FCA) to be produced for all developments located within DAM zones C1 and C2. Flood Zone B only requires an FCA if site levels are below the extreme (0.1%) flood level (as defined in Technical Guidance TAN15, Figure 1). The proposed development is located within DAM Zone A however as small areas are located within DAM Zone B, a detailed FCA is therefore required.
- 10.2.16 The vulnerability classification of different development types is identified in Figure 2 of TAN15. Utilities infrastructures are classed as less vulnerable development and are permitted within DAM Zones A, and Zone B and in Zone C2 subject to the application of the justification test.
- 10.2.17 The Vale of Glamorgan Local Development Plan (LDP) 2011-2026 was formally adopted on 28th June 2017. The Plan sets out the vision, objectives, strategy and policies for managing development in the Vale of Glamorgan and contains a number of local planning policies. It makes provision for the use of land for the purposes of housing, employment, retailing, recreation, transport, tourism, minerals, waste, and community uses. A significant proportion of the proposal Site is allocated in the Vale of Glamorgan Local Development Plan as within a Potential for Solar Energy Area (reference: Local Search Area 3 – Land west of Five Mile Lane) as per Policy MG30 – Local Search Areas for Solar Energy.
- 10.2.18 Identified policies are:
- Policy MD7 – Environmental Protection is a strategic policy protecting people,

residential amenity, property and / or the natural environment.

**10.3 ASSESSMENT APPROACH**

10.3.1 In order to establish the environmental impact of the proposed development on the hydrological regimes of the Site and its immediate environs, it was necessary to undertake the assessment in a number of stages. The initial stage comprised a desk study review of available information in order to determine (where possible) Site conditions in terms of water features (both surface and ground), water quality and flood risk.

10.3.2 The sources of information used in the desktop study are listed in in **Table 10.1**. Consultation has taken place with the relevant statutory bodies via pre-application discussions and the submission of an EIA Scoping Report submitted to the Planning Inspectorate Wales.

**Table 10.1: Data Sources**

Topic	Sources of Information
Topography	Ordnance Survey Maps Site topographic survey
Geology	BGS Bedrock and Superficial Geological Map BGS online data
Hydrogeology	NRW online data Relevant scientific literature
Hydrology	Metrological Office Historic Rainfall Data Flood Estimation Handbook (FEH) Webservice National Soil Resource Institute NRW Flood Risk Maps Development Advice Maps (DAM) Flood Map for Planning (FMfP) The SuDS Manual

10.3.3 The hydrological regime was considered in terms of existing conditions, and the effects of the proposed development. An assessment of the Site location in terms of flood risk was also undertaken. Existing conditions local to the Site (within the Site boundary) were also considered in terms of hydrological management and the collection of surface water.

10.3.4 In terms of assessing the Site, the following phases of the proposal have been considered, namely the construction, operational and decommissioning phases.

10.3.5 There are a number of potential impacts that have to be considered that could have a direct or indirect effect on hydrology, flood risk, water quality and drainage. These impacts may be transitional, but also can be more permanent in nature. The primary concerns relate to potential impacts on controlled water receptors which are considered to be of high significance.

10.3.6 The purpose of the EIA is to identify the likely ‘significance’ of environmental effects (beneficial or adverse) arising from a development. In broad terms, environmental effects are described as:

- Adverse – detrimental or negative effects to an environmental resource or receptor;
- Beneficial – advantageous or positive effect to an environmental resource or receptor; or
- Negligible – a neutral effect to an environmental resource or receptor.

10.3.7 Effects have been assessed in terms of:

- The magnitude of the impact –the degree of alteration (both positive and negative) from the baseline state; and
- The sensitivity of the receptor(s) subjected to the impact –this may relate to the value of a resource and the reversibility of impacts.

10.3.8 Any effect of Moderate or Major significance is considered to represent a likely significant effect for the purposes of the EIA Regulations. Significance of effects would be considered before and after mitigation.

10.3.9 The criteria for determining magnitude of impact is set out below in **Table 10.2**.

10.3.10 The sensitivity of a receptor is based on the importance of the receptor using the criteria below in **Table 10.3**.

**Table 10.2: Magnitude of Impacts and Criteria**

Magnitude of Effect	Criteria
High	Total loss or major/substantial alteration to elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.
Medium	Loss or alteration to one or more elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.
Low	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but the underlying character/composition/attributes of the baseline condition will be similar to the pre-development.
Negligible	Very little change from baseline conditions. Change not material, barely distinguishable or indistinguishable, approximating to a 'no change' situation.

**Table 10.3: Degree of Sensitivity Criteria**

Sensitivity	Criteria
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character or is of international or national importance.
Medium	The receptor/resource has moderate capacity to absorb change without significantly altering its present character or is of high and more than local (but not national or international) importance.
Low	The receptor/resource is tolerant of change without detrimental effect, is of low or local importance.
Negligible	The receptor/resource can accommodate change without material effect, is of limited importance.

10.3.11 Significance of effect is evaluated as a combination of the sensitivity of the receptor and the magnitude of change the development results in. Although the matrix in **Table 10.4** is designed to demonstrate an objective rationale to reach a conclusion about the potential significance of impact a degree of professional judgement is a key element in the evaluation process.

**Table 10.4: Significance of Effect**

		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Magnitude of Impact	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor/ Moderate	Negligible
	Low	Moderate	Minor/ Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

**Data Limitations**

10.3.12 Geological and hydrogeological data beneath the Site is limited to information which has been obtained from available ‘desk’ based sources, including maps and limited data from boreholes surrounding the Site. Full determination of the geological and hydrogeological regime beneath Site would require further intrusive investigation, which is not proposed or indeed considered as required for this assessment.

10.3.13 The NRW flood maps and the TAN15 DAMs can change over time. However, it is not considered that the above limitations would have a significant bearing on the outcome of this assessment.

**10.4 BASELINE CONDITIONS**

10.4.1 The assessment of baseline conditions included a review of the pertinent information available.

**Site Description and Topography**

10.4.2 The proposal Site covers an area of approximately 127 hectares (ha) of farmland located situated at circa 0.70km to the south of the village of Bonvilston in the Vale of Glamorgan.

10.4.3 The Site and surrounding areas are rural in nature, characterised by farmland, scrubland, established hedgerows and woodland blocks. The majority of the Site is relatively flat, with the exception of the north-west which falls away to the north and the western area of area 1 that falls away to the west.

10.4.4 There are two overhead power lines and associated pylons that run across the Site, one parallel to the northern boundary in an east to west alignment incorporating metal pylons and the second through the eastern area of the Site in a southeast to northwest alignment wooden poles.

10.4.5 Along the western boundary of the Site is an unnamed lane. A number of farms are located close to the Site boundary. Approximately 400m to the south and east is a 6MWp solar farm that has been operational since 2018 (Planning Ref. 2014/00798/FUL).

10.4.6 The villages of Bonvilston and St Nicholas are the nearest villages at approximately

0.70km north and approximately 1km, respectively.

10.4.7 Access to the proposal Site is taken directly from the A4226 (Five Mile Lane) via existing field gates.

**Catchment Hydrology**

10.4.8 All the rivers are fed by a network of agricultural drains and springs/issues which flow through or adjacent to the development areas. Currently the surface water runoff from all the Site discharges via infiltration to the ground or to the adjacent drainage ditches.

10.4.9 The River Waycock is located to the south east of the Site. Nant Llancarfan is located to the west of the Site boundary and Nant Whitton in located to the south. There are a number of open drains located within and around the Site boundary.

**Source Protection Zone**

10.4.10 The Site is not located within a NRW Source Protection Zone (SPZ).

**Ground Conditions**

10.4.11 The British Geological Survey (BGS) map shows that the superficial deposits consist of Glacial Sand and Gravel. The bedrock deposits vary across the Site and consist of:

- Dinantian Rocks (undifferentiated) – limestone with subordinate sandstone and argillaceous rocks.
- Triassic Rocks (undifferentiated) – sandstone and conglomerate, interbedded.
- Triassic Rocks (undifferentiated) – mudstone, siltstone and sandstone.
- Lias Group – mudstone, siltstone, limestone and sandstone.

**Surface Water Quality**

10.4.12 The Water Framework Directive (WFD) water quality information for the Site is shown in **Table 10.5**

10.4.13 There are no drinking water protected areas or nitrate vulnerable zones within the catchments.

**Table 10.5: WFD Surface Water Body Classification**

Type	Name	Water Body ID	Overall Rating	Chemical Rating	Ecological Rating
River	Waycock – headwaters to confluence with Kenson	GB110058026400	Moderate	Good	Moderate

**Surface Water Abstractions**

10.4.14 There are no licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day within 2km of the Site this includes active and historical records.

**Potable Water Abstractions**

10.4.15 There are no licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day within 2km of the Site this includes active and historical

records.

### Flooding

- 10.4.16 An FCA has been carried out for the Proposed Development in accordance with guidance contained in Planning Policy Wales and TAN15. The FCA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks would be managed so that the development remains safe throughout its lifetime, taking climate change into account. The FCA includes an assessment of the existing and proposed surface water drainage of the Site.
- 10.4.17 The Site is not at risk of flooding from a major source (e.g. fluvial and/or tidal). The majority of the Site is located within Zone A with very small proportion of the Site, to the west and east which is located within Zone B. However, it has been concluded that the Site has not historically flooded.
- 10.4.18 The Flood Map for Planning (FMfP) shows that the Site is located within Flood Zone 1 for rivers and sea flooding. The majority of the Site is located within Flood Zone 1 for surface water and/or small watercourses however, a small proportion of the Site is located within Flood Zone 3 with more than a 1 in 100 (1%) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change. This is associated with small watercourses and it should be noted that the proposed built development will be located within Flood Zone 1. The floodwater is shown to be retained within the channel of the watercourses.
- 10.4.19 There will be no net loss in flood storage capacity or impact on movement of floodwater across the Site. The overall direction of the movement of water will be maintained within the developed Site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed.
- 10.4.20 In conclusion, the flood risk to the Site can be considered to be limited; the Site is situated in DAM Zones A and B with a very low annual probability of flooding and from all sources.
- 10.4.21 TAN15 categorises development according to its vulnerability to flooding. There are three categories: emergency services; highly vulnerable development; and less vulnerable development. All residential premises are categorised as highly vulnerable development. Commercial, retail and general industrial development are categorised as less vulnerable development.
- 10.4.22 TAN15 does not explicitly define the flood risk vulnerability of renewable energy developments such as solar parks. However, it confirms that less vulnerable development describes development, such as the case with the proposed development, where the ability of occupants to decide on whether they wish to accept such risk is greater than in the highly vulnerable category, such as residential uses.
- 10.4.23 Furthermore, the proposed development will not have permanent staff located on the Site, the solar arrays are lifted off the ground and any sensitive equipment can be located to respect the Flood Zones and not within the areas at risk of flooding. The proposed development is not especially vulnerable to flooding and the proposed development would be considered as utilities infrastructure.



10.4.24 Recent planning applications for solar parks (some of which have also been assessed by the Planning Inspectorate) have been classified as 'less vulnerable' such as Rhyd Y Groes, Anglesey (ref: 20C310B/EIA/RE), Gwent Farmers' Community Solar Scheme, Llanwern, Newport, NP26 3D (ref: 18/0129) and Mamhilad Solar Park on land south of Little Mill Brickworks, Little Mill near Pontypool in Torfaen (ref: 15/P/00436).

10.4.25 The DAM classification therefore indicates that the Site is suitable for the proposed use subject to the application of justification test, including acceptability of consequences.

#### Groundwater

10.4.26 The superficial aquifers, which vary across the Site, have been designated as follows:

- Secondary A Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.
- Secondary Undifferentiated Aquifers are Assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

10.4.27 The bedrock aquifers, which vary across the Site, have been designated as follows:

- Principle Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers.
- Secondary A Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.
- Secondary B Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers
- Secondary Undifferentiated Aquifers are Assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

#### Groundwater Quality

10.4.28 The WFD groundwater quality information is shown in **Table 10.6**.

**Table 10.6: WFD Groundwater Body Classification**

Name	Water Body ID	Overall Rating	Chemical Rating	Ecological Rating
Thaw & Cadoxton Jurassic Lias	GB41002G201400	Good	Good	Good
Thaw & Cadoxton Carboniferous Limestone	GB41002G201600	Good	Good	Good

**Groundwater Abstractions**

10.4.29 The licensed groundwater water abstractions for sites extracting more than 20 cubic metres of water a day within 2km of the Site are shown in **Table 10.7**, this includes active and historical records.

**Table 10.7: Licensed Groundwater Abstractions**

Location	Details	
394m NW	Status: Historical Licence No: 21/58/21/0014 Details: General Farming & Domestic Direct Source: EAW Groundwater Point: WELL AT SHEEPCOURT Data Type: Point Name: Powell & Sons Ltd Easting: 307100 Northing: 174100	Annual Volume (m3): 382 Max Daily Volume (m3): 1.05 Original Application No: - Original Start Date: 28/03/1966 Expiry Date: - Issue No: 101 Version Start Date: 07/01/1993 Version End Date: -
461m SE	Status: Historical Licence No: 21/58/21/0006 Details: Horticultural Watering Direct Source: EAW Groundwater Point: WELL AT COED SION HYWEL (POINT B) Data Type: Point Name: National Trust Easting: 308870 Northing: 172600	Annual Volume (m3): 13638 Max Daily Volume (m3): 454.6 Original Application No: - Original Start Date: 14/02/1966 Expiry Date: - Issue No: 101 Version Start Date: 15/05/2013 Version End Date: -
530m SE	Status: Active Licence No: 21/58/21/0006 Details: Horticultural Watering – Medium Direct Source: Underground strata comprising of interbedded mudstone Point: - Data Type: Point Name: - Easting: 308900 Northing: 172500	Annual Volume (m3): 13,638 Max Daily Volume (m3): - Original Application No: - Original Start Date: May 15 2013 12:00AM Expiry Date: - Issue No: - Version Start Date: - Version End Date: -

Location	Details	
558m N	Status: Historical Licence No: 21/58/21/0024 Details: Spray Irrigation – Direct Direct Source: EAW Groundwater Point: BOREHOLE NEAR SHEEPCOURT FARM Data Type: Point Name: Powell & Sons Ltd Easting: 307420 Northing: 174400	Annual Volume (m3): 11000 Max Daily Volume (m3): 60 Original Application No: - Original Start Date: 25/02/1997 Expiry Date: - Issue No: 100 Version Start Date: 25/02/1997 Version End Date: -
558m N	Status: Historical Licence No: 21/58/21/0024 Details: Spray Irrigation – Direct – High Direct Source: - Point: - Data Type: Point Name: - Easting: 307420 Northing: 174400	Annual Volume (m3): 11000 Max Daily Volume (m3): - Original Application No: - Original Start Date: Feb 25 1997 12:00AM Expiry Date: - Issue No: - Version Start Date: - Version End Date: -
824m E	Status: Historical Licence No: 21/58/21/0007 Details: General Farming & Domestic Direct Source: EAW Groundwater Point: BOREHOLE NEAR DOGHILL FARM (POINT A) Data Type: Point Name: Williams Easting: 309220 Northing: 172500	Annual Volume (m3): - Max Daily Volume (m3): - Original Application No: - Original Start Date: 25/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 09/10/1976 Version End Date: -
824m E	Status: Historical Licence No: 21/58/21/0006 Details: Horticultural Watering Direct Source: EAW Groundwater Point: BOREHOLE NEAR DOGHILL FARM (POINT A) Data Type: Point Name: National Trust Easting: 309220 Northing: 172500	Annual Volume (m3): 13638 Max Daily Volume (m3): 454.6 Original Application No: - Original Start Date: 14/02/1966 Expiry Date: - Issue No: 101 Version Start Date: 15/05/2013 Version End Date: -
852m E	Status: Active Licence No: 21/58/21/0006 Details: Horticultural Watering – Medium Direct Source: Underground strata comprising of interbedded mudstone Point: -	Annual Volume (m3): 13,638 Max Daily Volume (m3): - Original Application No: - Original Start Date: May 15 2013 12:00AM Expiry Date: - Issue No: - Version Start Date: -

Location	Details	
	Data Type: Point Name: - Easting: 309250 Northing: 172500	Version End Date: -
1194m SE	Status: Historical Licence No: 21/58/21/0023 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: EAW Groundwater Point: BOREHOLE AT DYFFRYN HOUSE Data Type: Point Name: National Trust Easting: 309410 Northing: 172050	Annual Volume (m3): 10800 Max Daily Volume (m3): 450 Original Application No: - Original Start Date: 13/12/1996 Expiry Date: - Issue No: 101 Version Start Date: 15/05/2013 Version End Date: -
1194m SE	Status: Historical Licence No: 21/58/21/0023 Details: Make-Up Or Top Up Water Direct Source: EAW Groundwater Point: BOREHOLE AT DYFFRYN HOUSE Data Type: Point Name: National Trust Easting: 309410 Northing: 172050	Annual Volume (m3): 10800 Max Daily Volume (m3): 450 Original Application No: - Original Start Date: 13/12/1996 Expiry Date: - Issue No: 101 Version Start Date: 15/05/2013 Version End Date: -
1194m SE	Status: Active Licence No: 21/58/21/0023 Details: Make-up or Top-up Water – High Direct Source: - Point: - Data Type: Point Name: - Easting: 309410 Northing: 172050	Annual Volume (m3): 5,400 Max Daily Volume (m3): 244.80 Original Application No: - Original Start Date: May 15 2013 12:00AM Expiry Date: - Issue No: - Version Start Date: - Version End Date: -
1194m SE	Status: Active Licence No: 21/58/21/0023 Details: General Use relating to Secondary category – Medium Loss – Medium Direct Source: - Point: - Data Type: Point Name: - Easting: 309410 Northing: 172050	Annual Volume (m3): 5,400 Max Daily Volume (m3): 244.80 Original Application No: - Original Start Date: May 15 2013 12:00AM Expiry Date: - Issue No: - Version Start Date: - Version End Date: -

Location	Details	
1357m SE	Status: Historical Licence No: 21/58/21/0021 Details: General Farming & Domestic Direct Source: EAW Groundwater Point: BOREHOLE AT HOME FARM Data Type: Point Name: Bird & Sons Limited Easting: 309556 Northing: 171976	Annual Volume (m3): 8052 Max Daily Volume (m3): 22 Original Application No: - Original Start Date: 04/11/1996 Expiry Date: - Issue No: 100 Version Start Date: 01/04/2008 Version End Date: -
1357m SE	Status: Historical Licence No: 21/58/21/0021 Details: General Farming & Domestic – Medium Direct Source: - Point: - Data Type: Point Name: - Easting: 309556 Northing: 171976	Annual Volume (m3): 8052 Max Daily Volume (m3): - Original Application No: - Original Start Date: Apr 1 2008 12:00AM Expiry Date: - Issue No: - Version Start Date: - Version End Date: -
1362m SW	Status: Historical Licence No: 21/58/21/0019 Details: General Farming & Domestic Direct Source: EAW Groundwater Point: BOREHOLE AT WALTERSTON FARM (POINT B) Data Type: Point Name: Thomas & Son Easting: 306740 Northing: 171150	Annual Volume (m3): 21590.9 Max Daily Volume (m3): 178.92 Original Application No: - Original Start Date: 30/08/1991 Expiry Date: - Issue No: 100 Version Start Date: 30/08/1991 Version End Date: -
1363m SW	Status: Active Licence No: 21/58/21/0019 Details: General Farming & Domestic – Medium Direct Source: Underground strata Point: - Data Type: Point Name: - Easting: 306740 Northing: 171149	Annual Volume (m3): 5,681.80 Max Daily Volume (m3): 65.52 Original Application No: - Original Start Date: Aug 30 1991 12:00AM Expiry Date: - Issue No: - Version Start Date: - Version End Date: -

### Designated Sites

10.4.30 The whole Site is located within a Special Landscape Area (SLA) and mineral safeguarding area. Approximately 19ha of the western extent of the proposal Site lies within a Registered Historic Landscape of Lencarfan.

10.4.31 Approximately 190m to the south-west of the proposal Site boundary is Nant Whitton Woodlands Site of Special Scientific Interest (SSSI). The following Sites of Importance for Nature Conservation (SINC) are located adjacent to the proposal Site boundary:

- Coed Quinnet – adjacent to part of the western and southern boundary of Area 3.
- Land South of Ty'n-y-Coed – adjacent to part of the western boundary of Area 1.
- Redland Wood – adjacent to part of the northern boundary of Area 1.
- Coed cym - adjacent to part of the northern boundary of Area 2.
- Land along River Waycock – adjacent to part of the eastern boundary of Area 2.
- Brook Wood – adjacent to part of the southern boundary of Area 2.
- Betty Lucas Wood - adjacent to part of the southern boundary of Area 2.

10.4.32 Bonvilston Conservation Area is located circa 0.7km to the north and St Nicolas Conservation Area is circa 700m to the north-east of the Site. Scheduled Ancient Monument Ty'n-y-Coed Castle Ringwork and Coed y Cwm Ringwork are located in close proximity to the Site's northern boundary.

**10.5 IDENTIFIED RECEPTORS**

10.5.1 Based on the baseline conditions presented above, **Table 10.8** presents the sensitive receptors which have been considered in the following assessment, along with their sensitivity to change.

**Table 10.8: Identified Receptors**

Receptor	Sensitivity	Description
Site workers (i.e. construction workers)	Low	Flooding may impact upon workers during the construction phase, but their sensitivity is lowered as a result of their competency in their role as well as operating in teams and/or prescribed systems.
Flooding	Low	Flooding may impact upon neighbouring Site users.
Groundwater	Medium	Any water quality or quantity issues would only be felt over short distance and would be diluted rapidly.
Surface waters	Medium	Any water quality or quantity issues would only be felt over short distance of the watercourses compared to the overall length of the watercourses. Water quality issues would also be diluted rapidly within the watercourses.

**10.6 PROPOSED DEVELOPMENT**

10.6.1 The proposal will comprise the following:

- Photovoltaic (PV) panels
- Battery Energy Storage System

- Mounting frames - matt finished small section metal structure
- Scheme of landscaping and biodiversity enhancement
- Inverters and transformers and associated cabling (largely below ground)
- 132kV Distribution Network Operator (DNO) substation, DNO meter point, customer substation
- Deer fencing and infra-red CCTV (CCTV cameras would operate using motion sensors and would be positioned inward only to ensure privacy to neighbouring land and property)
- Temporary set down areas
- Internal service roads, and
- Use of existing Site access for the construction and operational phases.

10.6.2 The panels will be arranged in rows in an east-west alignment across the Site and will be angled between 10° and 35° to the horizontal and orientated south. All panels will be mounted on frames with a maximum height of circa 3m above ground level; the lowest part of the panel will measure approximately 1m above ground level. The rows of panels will be set between 4m and 6m apart to avoid overshadowing and to allow access for scheduled maintenance. Transformer and substations are typically 3m in height.

10.6.3 The batteries will store electricity and provide instant power to the grid when demand is required and when the solar farm is not generating power such as at night-time. The batteries will be accommodated in containers located in a secured compound within the Site boundary preferably located close to the point of connection to the local distribution network.

10.6.4 The developer has accepted a grid offer from the Distribution Network Operator (Western Power) to connect into the local distribution network at one of existing tower pylons located on Site.

10.6.5 The construction phase will last approximately 6 months after which the solar farm and battery units can operate for up to 40 years. A temporary set down and vehicle parking area will be provided for the construction phase within the Site boundary. As part of decommissioning, all equipment will be removed from the Site and the land will continue to be used for agriculture.

10.6.6 The deployment areas will be secured by a 2m high deer fence or similar with wooden posts, or an alternative to suit ecological requirements.

## 10.7 ASSESSMENT OF EFFECTS

### Hazard / Risk Source

10.7.1 The following potential sources of hazard/risk have been identified based on a review of the baseline environment, and construction and operational phases of the proposed development:

- Leaks and spills of fuels and oils associated with vehicles and equipment;
- Sediment loading of watercourses;
- Discharge of poor-quality water to watercourses; and
- Flooding of the Site.

10.7.2 The significance of any potential pollution or changes in groundwater levels and flow would be dependent on the nature of the incident, the mitigation measures, timing of the measures, and effectiveness of the measures and sensitivity of the potential receptors.

Conceptual Model and Preliminary Impact (Risk) Assessment

10.7.3 The Site conceptual model and assessment of the environmental risk during both the construction and operation phases of the development is presented in **Table 10.9** and **Table 10.10**. The potential effects from the decommissioning phase are likely to be similar to the construction phase.



Table 10.9: Conceptual Model and Preliminary Impact (Risk) Assessment – Construction and Decommissioning Phase

Hazard/Risk Source	Receptor	Pathway	Magnitude	Sensitivity	Significance of Effect
Leaks and spills of fuels and oils associated with vehicles and equipment	Site users, groundwater and surface waters	Direct contact, ingestion and inhalation and also contaminant transport through permeable geology and groundwater	Medium	Medium	<b>Moderate Adverse</b> - small quantities of fuels and oils to be held onsite and geology will impede transfer of significant level of contaminants to groundwater
Sediment loading of watercourses	Surface waters	Surface flows	Medium	Medium	<b>Moderate Adverse</b> - inappropriate management of surface waters during construction could result in sediment loading of watercourses
Discharge of poor-quality water to watercourses	Surface waters	Surface flows	Medium	Medium	<b>Moderate Adverse</b> - inappropriate management of surface waters during construction could result in discharge of poor-quality water to watercourses
Flooding of the Site generating physical hazards and contamination of floodwaters	Construction workers and equipment	Direct contact	Low	Medium	<b>Minor/Moderate Adverse</b> - the risk of flooding of the sites is low, is well understood and a warning system will be in place
	Neighbouring site users	Direct contact	Low	Medium	<b>Minor/Moderate Adverse</b> - the risk of flooding of the sites is low, is well understood and a warning system will be in place
	Surface waters	Surface flows	Low	Medium	<b>Minor/Moderate Adverse</b> - the risk of flooding of the sites is low, is well understood and a warning system will be in place

**Table 10.10: Conceptual Model and Preliminary Impact (Risk) Assessment –Operational Phase**

Hazard/Risk Source	Receptor	Pathway	Magnitude	Sensitivity	Significance of Effect
Leaks and spills of fuels and oils associated with vehicles and equipment	Site users, groundwater and surface waters	Direct contact, ingestion and inhalation	Low	Medium	<b>Minor/Moderate Adverse</b> - small quantities of fuels and oils to be held onsite and geology will impede transfer of significant level of contaminants to groundwater
Sediment loading of watercourses	Surface waters	Surface flows	Low	Medium	<b>Minor/Moderate Adverse</b> - inappropriate management of surface waters could result in sediment loading of watercourses
Discharge of poor-quality water to watercourses	Surface waters	Surface flows	Low	Medium	<b>Minor/Moderate Adverse</b> - inappropriate management of surface waters could result in discharge of poor-quality water to watercourses
Flooding of development sites generating physical hazards and contamination of floodwaters	The Site	Direct contact	Negligible	Medium	<b>Negligible</b> - the risk of flooding of the sites is low, is well understood and a warning system will be in place
	Neighbouring site users	Direct contact	Negligible	Medium	<b>Negligible</b> - the risk of flooding of the sites is low, is well understood and a warning system will be in place
	Surface waters	Surface flows	Negligible	Medium	<b>Negligible</b> - the risk of flooding of the sites is low, is well understood and a warning system will be in place

## 10.8 PROPOSED MITIGATION

- 10.8.1 The design of the solar farm and battery storage compound has incorporated opportunities to mitigate the potential impacts to the water environment. It is considered that the potential impacts associated with the construction/decommissioning and operational phases of the development on potential receptors can be adequately mitigated by the measures discussed below.
- 10.8.2 The solar arrays and vulnerable infrastructure will be located above ground level. The modules are raised off the ground such that the leading edge of each panel will be approximately 0.90m off the ground and the top edge approximately 3m above ground level. Consequently, the panels will be unaffected by floodwater depths.
- 10.8.3 The frame supporting the solar panels should not impede overland flow or reduce flood storage capacity, as it would only be the legs which would be within the path of overland flow or floodwaters. The legs are of narrow dimension (60mm) and well-spaced (between 4 to 6m apart).
- 10.8.4 The panels are designed so that they have minimal foundations. This limits disturbance of soils/loss of resource and reduces the volume of concrete required. This would also therefore limit the potential for disruption of surface and groundwater flows.
- 10.8.5 The ancillary structures such as substation and transformers are also small structures and therefore only require shallow foundations, limiting ground disturbance and disruption to overland flow routes. The proposals are based on maintaining the existing drainage, the structures associated with the proposal will introduce only small areas of impermeable surfacing. It is not proposed to install new drainage infrastructure but maintain existing greenfield runoff rates.
- 10.8.6 Existing farm access tracks will be used, and the position of new access tracks will avoid the necessity for watercourse crossings to avoid changes to in-channel flow and disturbance of the riparian habitat.
- 10.8.7 The Site and surrounding area are located within DAM Zone A and therefore a permanently safe and dry access can be maintained. The existing highways are generally raised about 600mm above the neighbouring fields.
- 10.8.8 Furthermore, solar farms and Battery Energy Storage Systems are controlled remotely and attendance at the Site in adverse weather conditions is not conducive to maintenance activities etc. If the weather is inclement, or a warning of flooding is issued, the solar farm will not be visited.
- 10.8.9 A buffer strip adjacent to the top of any small watercourse will need to be retained for maintenance purposes. This will be free of built development and is required by the Local Planning Authority/Lead Local Flood Authority. The buffer strip will also mitigate the impact of flooding.

### Construction Phase

- 10.8.10 Construction best practice measures/mitigation will be in operation during the period of construction of the solar farm. All details of best practice will be based on current guidance produced by CIRIA and NRW which cover good construction techniques and pollution prevention and control measures. The proposed measures will be detailed

within the detailed Construction Environmental Management Plan (CEMP) which is likely to be required by means of a planning condition.

10.8.11 The contractor for the works will provide 24-hour emergency contact details to NRW's Senior Environment Officer prior to the commencement of the works on Site.

10.8.12 A Surface Water Management Plan (SWMP) has been developed to manage the additional Site runoff anticipated during the construction phase. The detail will be confirmed within a SuDS Approval Body (SAB) application.

10.8.13 The main elements to the CEMP would be:

- Soil management.
- Erosion and sediment control.
- Storage/Use of Construction Materials.
- Vehicle Maintenance.
- Environmental Monitoring.
- Spillage – Emergency Action.

10.8.14 During construction (and decommissioning) it is anticipated that a temporary compound will be established to allow the materials to be off-loaded from HGVs, and then transferred to the Site using smaller vehicles. The construction compound will have a temporary surfacing of hardcore; on completion of the construction works the hardcore surface will be removed and panels will be installed and the ground seeded. Any rainfall on the temporary compound will runoff to adjacent grassed permeable areas.

#### Soil Management

10.8.15 Topsoil stripping will be minimised to reduce Site runoff volumes. The main areas of soil disturbance will be when new access tracks are formed and for excavation of foundations for substation/transformers, this should be limited in areal extent based on the current proposal. In order to avoid/minimise compaction of the soils, the access tracking and compounds will be formed pre-construction using permeable materials; gravel laid onto geotextile to limit compaction and hence surface water runoff intensification.

10.8.16 Preserving the quantity and quality of the Site topsoil is critical to preserving the Site runoff rates both during and after construction and to promote stabilisation vegetation establishment. Topsoil stripping will be limited to the areas necessary for access road and construction and for the creation of temporary laydown areas, as required. All stripped topsoil must remain on the Site and be reused for landscaping or restoration. Erosion and sediment control measures for topsoil stockpiles are described below.

#### Erosion and Sediment Control Plan

10.8.17 The existing and proposed (post-construction) ground surface slope gradients at the Site are classified as shallow and gentle (< 4%), with predominantly long slopes (greater than 30m). Site soils are sands and silty sands, which have low and high erosion potentials, respectively.

#### Erosion and Sediment Control Measures

- 10.8.18 The various construction activities required to construct the Proposed Development include minor grading activities and general construction traffic. If left unmitigated, these activities will result in impacts ranging from disturbance of soils to potential erosion and sediment transport to offsite locations.
- 10.8.19 All existing drainage in the surrounding area should be identified and protected to avoid unintentional damage/interruption as a consequence of the Site operations and ensure they continue to operate effectively.
- 10.8.20 The current proposals do not require the installation of additional drainage infrastructure as it is not anticipated that the development will create additional runoff. However, during construction works where temporary surface water drainage is provided it should be designed with suitable sediment, oil and fuel control (such as proprietary silt traps, catch pits, straw bales, swales etc). This will ensure that any sediment, oils and fuels carried by overland flow during rainfall events are collected and trapped prior to discharge of surface water to the field boundary drains/main rivers.
- 10.8.21 It is unlikely given the low permeability of the soils and the shallow foundations required for the ancillary structures that excavations will require dewatering. However, if this is required, any waters pumped from excavations will be disposed to the temporary drainage system which will include sediment traps prior to discharge to watercourses.
- 10.8.22 Spillage and Emergency Procedures outlined in the CEMP would be followed in the event of a pollution incident. The plan would include the provision of appropriate emergency response equipment on-site and staff training in emergency procedures.
- 10.8.23 During construction, all Site run-off would be intercepted and treated to remove sediment prior to discharge off Site. The following guidelines will be observed during the operation of the Site:
- CIRIA. Control of water pollution from construction sites C532 (2001).
  - CIRIA. Environmental Good Practice on Site C650 (2005).
  - CIRIA. The SuDS Manual C753 (2015).
  - Pollution Prevention Guidelines PPG1: Understanding Your Environmental Responsibilities (July 2013).
  - Guidance for Pollution Prevention GPP2: Above ground oil storage tanks (January 2018).
  - Guidance for Pollution Prevention GPP5: Works and maintenance in or near water (January 2017).
  - Pollution Prevention Guidelines PPG6: Working at construction and demolition sites (March 2012).
  - Pollution Prevention Guidelines PPG7: The safe operation of refuelling facilities (July 2011).
  - Guidance for Pollution Prevention GPP8: Safe storage and disposal of used oils (July 2017).
  - Guidance for Pollution Prevention GPP13: Vehicle washing and cleaning (April 2017).
  - Guidance for Pollution Prevention GPP21: Incident Response Planning (July 2017).

- Guidance for Pollution Prevention GPP22: Dealing with spills (October 2018).
- Guidance for Pollution Prevention GPP23: Safe storage - drums and intermediate bulk containers (February 2019).
- Government Guidance 'Oil storage regulations for businesses' (2015).
- Government Guidance 'Manage water on land: guidance for land managers' (2015).

10.8.24 Erosion control will be achieved primarily by:

- Managing disturbed soils using soil conservation practices to reduce runoff and sediment transport during construction.
- Constructing barriers to filter runoff.

10.8.25 Erosion and sediment control measures will be implemented prior to any grading or servicing works commencing and include, but are not necessarily limited to, the following measures:

- A perimeter silt fence will be installed at the downstream side of the work limits.
- A 5m wide vegetated buffer will be provided on the downstream side of all disturbed areas. The vegetated buffer will consist of undisturbed native vegetation and any areas of sparse vegetation will be seeded. The vegetation will trap mobilised silt and sediment.
- A construction entrance feature ("mud mat") will be provided at the Site entrance to minimise the offsite transport of sediment via construction vehicles.
- The access road will be cleaned of any sediment deposited by Site construction traffic.
- Stabilise topsoil stockpiles expected to be left in place longer than 30 days with vegetative cover (i.e., hydroseeding) or a rolled erosion control product in the event of unfavourable growing conditions (i.e., during the winter).
- Re-vegetate all disturbed areas where construction is not expected for 30 days with a minimum 50mm of topsoil and hydro-seeding or other stabilizing vegetation / erosion protection measures. If vegetation establishment is not possible, given seasonal restriction or other revegetation limiting factors, the disturbed area should be stabilised against erosion impacts by non-vegetated means such as erosion control blankets.
- In the event of inclement weather or unfavourable terrain for construction, construction best practices, such as temporary rig-mats may be used to prevent disruption of surface soils and vegetative cover by construction vehicles and equipment.

10.8.26 The erosion and sediment control measures shall be maintained in good repair during the entire construction period and removed as contributing drainage areas are restored and stabilised where they are not required anymore otherwise they will be left in-situ for the operational phase. In addition, the condition of erosion control works, their

overall performance, and any repairs, replacement, or modifications to the installed item shall be noted in logbooks to be kept on-site.

#### Erosion and Sediment Control Contingency Plan

10.8.27 The purpose of the Erosion and Sediment Control contingency plan is to help minimise the risk or consequence of failure of the erosion and sediment control works. Failure could result from insufficient measures, lack of maintenance, or severe weather conditions. The contingency plan includes two areas of consideration: the contingency measures that will be implemented where there is potential for failure; and the procedures that will be followed where a failure has occurred.

10.8.28 The Contractor shall be responsible for following the Erosion and Sediment Control contingency plan, and will prepare the following items:

- Workers shall be on call for emergency situations for all aspects of the emergency from design to construction of emergency sediment and erosion control measures. Any associated health and safety issues are the responsibility of the Contractor.
- Heavy duty silt fence, pumps, double-net straw matting erosion control blankets, straw bales and stakes, sandbags, appropriately sized riprap, and clean gravel fill shall be available on-site for emergency installation.
- Heavy equipment shall be on standby for emergency works.
- A contact list for any further required equipment or materials shall be prepared and made available for emergency use.

#### Contingency Measures where there is a High Risk of Failure

10.8.29 Conditions that may potentially cause failures can be identified through two methods:

- High Risk Identified Through Monitoring

10.8.30 Where monitoring has identified a high potential for failure, steps shall be immediately taken to reduce the risk. These measures may include repair to existing measures, modification of existing measures, and the addition of new measures.

- Severe Weather Anticipated

10.8.31 In cases where the weather forecast indicates that significant rainfall (>10mm) is expected within a 24-hour period, the Contractor shall immediately complete the following:

- Verify that all erosion and sediment control measures are secure and that there is no exposed soil that could erode and be deposited downstream.
- Verify that all other measures are in good working order.
- Monitor all measures during the rainfall event, and where a potential for failure is identified, take corrective measures.

10.8.32 If unforeseen events cause the strategies set out in the contingency plan to be insufficient or inappropriate to meet the objective of containing sediment within the work limits, the Contractor will respond in a timely manner with all reasonable measures consistent with safety, to prevent, counteract or remedy any negative effects on the natural environment or adjacent properties.

### Contingency Measures in Case of Failure

10.8.33 In the event of a failure, the Contractor will cease all construction related work and focus on erosion and sediment control as required to effectively stabilise the Site where a failure has occurred or is imminent.

10.8.34 If significant long-term damage to downstream habitat or property is suspected, the Contractor will immediately assess and document the situation and report the incident to NRW. Development of the initial restoration plan will begin within 24 hours of the discovery of failure and will be implemented as soon as possible. The plan will address:

- Removal and disposal of sediment from outside the work limits.
- Restoration of the affected area.
- Restoration of any areas disturbed through deposition or removal.

### Erosion and Sediment Control Monitoring Programme

10.8.35 To ensure the effectiveness of the various erosion and sediment control measures, a routine programme should be implemented which includes the inspection of the erosion and sediment controls daily and after each significant rainfall event (10mm), and immediate repair of any deficiencies. Non-urgent repairs (i.e., no immediate risk of sediment discharges to the downstream environment) will be completed within 48 hours of identifying the deficiency, or prior to the next anticipated rainfall event, whichever is less. This program will consist of the following activities:

- Visual inspection of the measures to ensure discharged flows are generally free of sediment and turbidity.
- Inspection of vegetation protection, erosion control blankets and silt fencing to ensure that they are maintained in good repair.
- Removal of construction debris that may accumulate.
- Implementation of remedial measures including erosion stabilisation, repair of damaged measures and any other remediation where required.

### Storage/Use of Construction Materials

10.8.36 All soil stockpiles, construction materials, equipment and chemicals will be placed away from watercourses and outside the Flood Zone 3 (including welfare facilities). All regulations will be adhered to for the storage of fuels and chemicals including adequate bunding, location onto gravelled areas within the construction compound. All vehicle refuelling will be within the construction compound, away from watercourses.

10.8.37 When excavating to form the service roads, work should be programmed to ensure that volumes of excavated and imported material are not stored for significant lengths of time.

10.8.38 High risk construction activities such as concrete batching which can produce alkaline runoff which is highly toxic to aquatic organisms will be undertaken on gravelled areas at a suitable distance from surface watercourses/drains. Its transportation to the point of use on Site will be controlled, no wet concrete will be used in and around watercourses.

10.8.39 All welfare facilities to be adequately designed and maintained to ensure all sewage



disposed of appropriately, likely to be tankered for off-site disposal.

10.8.40 Standard pollution prevention procedures are to be implemented during the operational phase based on industry best practice and the GPPs PPGs, other NRW guidance, CIRIA document C532 “Control of Water Pollution from Construction Sites” and CIRIA document C753 “The Site SuDS Manual” would mitigate the risks to surface water quality. Examples of some of the measures that would be adopted at the Site are included below, to mitigate potential impacts on the water environment:

- Silt traps, straw bales placed within stream channel and temporary settlement lagoons.
- Protective coverings to stockpiles and locations away from watercourses.
- Retention of vegetated strips along watercourses.
- Tanked areas for plant and wheel washing.
- Bunded fuel storage and refuelling areas.
- Provision of spill kits.
- Location refuelling areas away from watercourses.
- Provision of vegetation/grass cover on earth stockpiles.

#### Vehicle Maintenance

10.8.41 It is expected that all vehicles used will be in good order and fit for purpose, therefore only emergency maintenance will be undertaken within designated areas away from watercourses etc.

10.8.42 In accordance with the GPPs and PPGs, all fuel tanks on-site shall have a bunded containment of a minimum of 110% fuel tank capacity. There would be no drainage point from the bunded containment area; tamperproof taps and valves would be installed, and all empty fuel containers or drums would be stored within a containment area prior to their removal or disposal from the Site. Oil traps would be incorporated in pertinent drainage systems to prevent accidental spillage being discharged into surface runoff. Spill kits would be stored at refuelling areas and would include sand or other suitable containment and absorbent material.

10.8.43 Best practice measures would be undertaken when refuelling of plant and machinery. Where fuelling of large machinery is required, drip trays and absorbent mats and pellets would be used to contain or absorb accidental spillages. Plant maintenance would also be undertaken in a designated area and similar contamination prevention measures would be adopted.

#### Environmental Monitoring

10.8.44 A monitoring plan would be included within the CEMP to ensure compliance, which will likely include water quality monitoring and inspection of drainage ditches/watercourses prior to and during the construction programme. Monitoring programme will be agreed with NRW and Vale of Glamorgan Council to ensure effectiveness of mitigation measures to protect the water environment.

10.8.45 The phasing of the works can also be devised to mitigate potential impacts e.g., to avoid compaction of the soils the access tracking and compounds will be formed pre-

construction using permeable materials; gravel laid onto geotextile to limit compaction and hence surface water run-off intensification.

- 10.8.46 Prior to the works commencing a risk assessment considering the soil type, groundwater levels, the normal annual rainfall patterns and pollution risk will be carried out.

#### Spillage – Emergency Action

- 10.8.47 All materials and equipment used for Site preparation and construction will be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from migrating to offsite receivers.
- 10.8.48 Spillage and Emergency Procedures outlined in the CEMP would be followed in the event of a pollution incident and would be developed in consultation with NRW. The plan would include the provision of appropriate emergency response equipment on-site and staff training in emergency procedures. GPP21 would be integrated into the Site emergency procedures.
- 10.8.49 Refuelling and maintenance of construction equipment should occur in designated areas, a minimum of 30m from a water body, wetland, or other sensitive receiver.
- 10.8.50 Most spillages on development sites are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore, small spillages of oil, milk or other known organic substances should be removed where possible using soak mats as recommended by NRW with residual spillage allowed to bioremediate in the drainage system.
- 10.8.51 In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung(s), (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or closely woven fabric.).

#### Operational Phase

- 10.8.52 The proposed access tracks that will be used to service the inverter and transformer units will be constructed from permeable material. This will ensure that the access tracks remain permeable allowing surface water to infiltrate into the soil substrate, therefore the access tracks will not result in an increase in the impermeable area.
- 10.8.53 The proposed transformers, cabins and substations will be constructed from impermeable surfaces however, these will stand on an area of permeable surfaces.
- 10.8.54 The transformer and cabin plinths will be founded on concrete pads surrounded by permeable surfaces.
- 10.8.55 The proposed PV modules will consist of an aluminium frame, with stainless steel supports and concrete shoes. Greenfield conditions will be retained as alluded to in the BRE Planning Guidance for the Development of Large-Scale Ground Mounted Solar PV Systems. Although the solar panels will divert the downward path of falling rain, being raised off the ground on frames, they will not reduce the permeable area where they are sited. Any rainfall that does fall onto the Site will, as now, infiltrates into the soil substrate.

- 10.8.56 It is anticipated that rain falling on each of the solar PV modules will fall underneath the downslope of the panels. A gap of approximately 20mm will allow water to drain off each PV module (the 20mm gap surrounds all sides of the panels). The erection of the solar panels will require the use of light machinery; however, it is anticipated that this would not lead to irreversible compaction of soils on the Site. Therefore, infiltration should not be limited by compaction of soils. The land on the Site can continue to be used for agricultural purposes (sheep grazing or similar) or for biodiversity enhancement following installation of the panels.
- 10.8.57 There should, therefore, be no perceivable changes to the upstream or downstream hydrology and to flood risk as a result of the proposals. In terms of surface water runoff, the proposals will not increase the impermeable area on the Site, as the size of the transformers and PV modules are considered to be negligible in the context of the Site areas.
- 10.8.58 It is generally accepted that the presence of solar panels on a site may slightly change the pattern of runoff with the potential for minor erosion at the base of the panels. There is empirical evidence (Cook and McCuen (2013) Hydrologic Response to Solar Farms, pg 536-541, Journal of Hydrologic Engineering, ACSE, May 2013), however, on the effect of solar development which found that with well-maintained grass underneath the panels, the solar panels themselves did not have a significant impact on the runoff volumes, peaks or time to peak. The analysis found that, with bare ground or gravel cover beneath the panels as a result of design decisions or lack of maintenance, peak discharge may increase resulting in the need for stormwater management.
- 10.8.59 Natural England has provided guidance on solar parks in the form of Technical Information Note (TIN) 101, although TIN101 is not specific to Wales, it provides useful information. This guidance provides an overview of the potential effects and possible mitigation measures for soil erosion and increased runoff, amongst others. TIN101 states that “The key to avoiding increased run-off and soil into watercourses is to maintain soil permeability and vegetative cover. Permeable land surfaces underneath and between panels should be able to absorb rainfall as long as they are not compacted and there is some vegetation to bind the soil surface.”
- 10.8.60 TIN101 concludes that “the risks of run-off and soil erosion are lowest on low gradient land with cohesive soils and highest on dry, sandy and steeply sloping soil surfaces”; this highlights the effect of slope on runoff rates and soil erosion. Furthermore, the slope aspect of the land can also influence runoff rates and soil erosion. The aspect of the solar panels will always be south-facing (in the UK) and, therefore, north or south facing slopes will result in runoff flowing in a parallel direction to that of the runoff from the panels thereby remaining relatively diffuse and unlikely to result in concentrated flows that could cause soil erosion, apart from where very steep slopes occur.
- 10.8.61 The proposed development is considered to have a relatively low gradient, with south-facing slope. A grassed surface will be maintained at the Site to reduce the likelihood of overland flow or soil erosion occurring which, based on this assessment, is considered to be low.
- 10.8.62 Any local erosion which might result from this trend will be mitigated by the thick sward of tussocky grass germinated both beneath and between the panels and its regime of

regular maintenance and therefore, there will be no increase in flood risk off the Site.

10.8.63 As there is no history of surface water flooding at the Site it is likely that the current drainage system is sufficient for the current and proposed Site use. The surface water runoff will not increase post-application compared to pre-application and there will be no increase in surface water flood risk to the Site and off-site locations. No changes to the current surface water network are proposed. Following development, surface water flows from the Site will continue to discharge to the ground.

10.8.64 Recent solar project experience has shown that several growing seasons are necessary for the Site restoration vegetation to become fully established. Consequently, the proposed vegetated buffers used to manage runoff during the Site construction will remain post-construction to mitigate the risk of downstream flooding or erosion caused by the proposed development.

10.8.65 Temporary erosion and sediment control measures implemented during construction will remain in place until the Site restoration vegetation has become sufficiently established to provide adequate stabilisation. The temporary erosion and sediment control measures can then be removed and disposed of off-site.

10.8.66 Natural England's 'Technical Information Note TIN101: Solar Parks: Maximising Environmental Benefits' encourages existing land drainage to be maintained. Existing onsite features will therefore be retained in their existing state and will continue to intercept overland flows from the Site.

10.8.67 An SWMP has been developed to manage the Site runoff anticipated during the operational phase. The detail will be confirmed within the SAB submission.

#### Vegetated Buffers

10.8.68 Vegetation can be used to provide water quality benefits, this is achieved by the runoff/vegetation interaction which reduces the velocity of runoff, thereby promoting the sedimentation of particulate matter. The vegetation also provides nutrient uptake benefits to help reduce biological pollutants such as nitrogen and phosphorous. Where required the vegetation will be re-instated and replanted to improve the current situation. The vegetation will trap mobilised silt and sediment.

#### Stabilisation Vegetation

10.8.69 All permeable surfaces within the Site will be stabilised with a restoration seed mix that will provide year-round surface cover. The stabilisation vegetation will improve the Site hydrologic characteristics, reducing both the peak flows and volumes.

10.8.70 Prior to restoration seeding, the work limits will be scarified to a minimum depth of 150mm, to mitigate soil compaction caused by construction traffic and to promote seed establishment. In accordance with the guidance presented, scarification will be performed with a chisel plow to retain as much vegetation residue on the soil surface as possible.

#### Long Term Erosion and Sediment Control

10.8.71 Approximately one year after completion of construction, the Applicant will complete a Site inspection to ensure that long-term erosion control measures have been effective. Seeded or replanted areas will be inspected to ensure that vegetation measures were

successful, and reseeded or replanted will occur where necessary.

10.8.72 If erosion control measures are found to be less than fully effective during this survey, reseeded or replanted of problem areas will take place. Should there be residual effects noted during post-construction monitoring, advice on contingency measures will be sought and applied.

**Monitoring and Maintenance**

10.8.73 The proposed SWMP incorporates passive and simple surface water runoff management practices, with operational and maintenance requirements to match. The Site Owner’s inspection, operational, and maintenance activities generally consist of:

- A semi-annual walking inspection of the entire Site should be completed during the spring and autumn to identify areas of bare soil and/or erosion. Remediation efforts would typically involve re-grading the affected area and/or re-vegetating with sod or appropriate seed mix, with fertilizer and water applied as necessary to ensure germination and stabilisation.
- Concurrent with the walking inspections, a visual assessment of any areas of persistent sediment build-up should be identified. Excessive sedimentation is an issue requiring attention if it remains in a non-vegetated condition and is, therefore, prone to re-suspension and transport downstream. If any such condition occurs, the sediment should be removed and the area re-stabilised.
- The walking inspections will also include a review of the ground surface conditions along the entire downstream Site perimeter to identify any areas of erosion or concentrated surface water discharge. Downstream impacts will be identified, and the Owner will develop a remediation plan to address them.
- The density and health of vegetation should be evaluated during the walking inspections. Deficiencies in this regard could be indicative of poor species selection or poor growth, and replanting should be undertaken to ensure sufficient vegetation densities.
- Driving on the Site should be avoided during wet periods to reduce the possibility of excessive rutting.

**10.9 RESIDUAL IMPACTS**

10.9.1 This section summarises the significance of the anticipated residual environmental effects, which are those that remain after all proposed mitigation measures are implemented. The residual effects are summarised below in **Table 10.11** below.

**Table 10.11: Summary of Residual Effects**

Potential Effect	Significance of Effects	Mitigation	Residual Effect
<b>Construction Phase and Decommissioning Phase</b>			
Leaks and spills of fuels and oils associated with vehicles and equipment	Moderate Adverse	CEMP, Surface Water Management Plan	Negligible

Sediment loading of watercourses	Moderate Adverse	CEMP, Surface Water Management Plan	Negligible
Discharge of poor-quality water to watercourses	Moderate Adverse	CEMP, Surface Water Management Plan	Negligible
Flooding of the Site generating physical hazards and contamination of floodwaters	Minor/Moderate Adverse	CEMP, Surface Water Management Plan	Negligible
<b>Operation Phase</b>			
Leaks and spills of fuels and oils associated with vehicles and equipment	Minor/Moderate Adverse	EMP, Surface Water Management Plan	Negligible
Sediment loading of watercourses	Minor/Moderate Adverse	EMP, Surface Water Management Plan	Negligible
Discharge of poor-quality water to watercourses	Minor/Moderate Adverse	EMP, Surface Water Management Plan	Negligible
Flooding offsite generating physical hazards and contamination of floodwaters	Negligible	EMP, Surface Water Management Plan	Negligible

## 10.10 SUMMARY AND CONCLUSIONS

- 10.10.1 This Environmental Impact Assessment has considered the potential effects of the proposed development on hydrology drainage and flood risk.
- 10.10.2 An FCA (**Appendix 10.1**, Doc Ref. 4.01.10) has been prepared to inform this chapter of the ES for the proposed development. The FCA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed, taking climate change into account. The FCA identifies opportunities to reduce the probability and consequences of flooding.
- 10.10.3 Including within the FCA is a Surface Water Management Strategy that ensures that a sustainable drainage solution can be achieved, which manages and reduces the flood risk posed by the surface water runoff from the site as well as providing water quality benefits. There is empirical evidence of the effect of solar development which has found that, with well-maintained grass underneath the panels, the solar panels themselves do not have a significant impact on the runoff volumes of surface water.
- 10.10.4 Construction of the proposed development has the potential to impact upon flood risk and surface water quality. However, the effects are likely to be localised, temporary and controlled by embedded mitigation measures and further mitigation measures, such that the residual effects would have a negligible effect and no significant residual effect.

10.10.5 Similarly, the potential effects arising during the operational of the proposed development would be controlled by embedded mitigation measures and further mitigation measures, such that the residual effects would have a negligible effect and no significant residual effect.

10.10.6 The findings of this chapter have demonstrated that the development would not result in any significant residual adverse impacts on drainage or flood risk.



## 11. ECOLOGY



## 11.1 INTRODUCTION

11.1.1 This chapter has been produced by FPCR Environment and Design Ltd (FPCR). Its purpose is to provide an Ecological Impact Assessment (EclA) of the proposed development. It has been informed by a combination of desk study and field survey, as well as the scoping exercises carried out in 2021 with the Planning Inspectorate and consultation with statutory bodies including Natural Resources Wales (NRW).

## 11.2 CONTEXT

11.2.1 This chapter focuses on the Assessment stage of the EIA, which considers the potential effects of the development on the surrounding environment relating to Ecology and Conservation, during the construction, operation and decommissioning phases of the solar farm project.

11.2.2 Details of the Application Site including the site location and general site description are provided in Chapter 2 of this Environmental Statement (ES). A full description of the proposed development is given in Chapter 3. The details provided in those sections will be used throughout this chapter to inform the assessment.

11.2.3 This assessment is carried out in accordance with the principles contained within the relevant legislation, including:

- Wildlife and Countryside Act 1981 (as amended)
- Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019
- Hedgerow Regulations 1997

11.2.4 The Welsh Government published the revised Planning Policy Wales Edition 11 (PPW) in February 2021 which forms the overarching national level source of planning policy for Wales. Chapter 6- Distinctive and Natural Places sets out the requirement to consider biodiversity in planning decisions.

11.2.5 The Application Site falls within the Vale of Glamorgan County Borough Council area, and several local policies detailed in the Vale of Glamorgan County Borough Council Local Development Plan (adopted in June 2017) are of relevance to this assessment. Those of particular importance to this chapter are Policy SP10- Built and Natural Environment, Policy MD7- Environmental Protection and Policy MD89- Promoting Biodiversity. Details of the relevant policy wordings are provided in Chapter 4 of this ES.

11.2.6 All relevant guidance is summarised as follows:

- Chartered Institute of Ecology and Environmental Management (CIEEM, 2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal. This is the main EIA guidance for ecology and the one with which the methodology laid out in Section 11.3 is based on.
- British Standards (2013) BS 42020:2013 Biodiversity. Code of practice for planning and development.
- Most protected species groups and survey types have specific published guidance that are the industry standards, and each is referenced under the relevant heading in the methodology section below.

### 11.3 ASSESSMENT APPROACH

11.3.1 This assessment was undertaken in accordance with the Ecological Impact Assessment (EclA) Guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

#### Study Area

11.3.2 For the purposes of this chapter, the terms 'Application Site' and 'Site' refer to all land within the red line boundary as shown in **Figure 1 (Appendix 11.1, Drawing number 9468-E-01B)**, Doc Ref. 4.01.11a).

11.3.3 The Zone of Influence (Zol) includes a 10km search for European designated sites; a 2km search for nationally designated sites and a 2km search for non-statutory designated sites and legally protected and notable species. While it was not possible for a full survey of land immediately adjacent to the red line boundary, adjacent land has been considered within the Zol and highlighted where considered relevant.

11.3.4 The local ecological network in terms of the broad green infrastructure on and offsite is included in the Zol where impacts are likely to be felt. This includes structures and linear features such as hedges, and watercourses, and connections with other habitats, protected sites and other developments. The accessibility of the network is also considered in terms of lighting for nocturnal species and fragmentation from breaks and habitat loss.

11.3.5 The Zol extends to the projects relevant to the cumulative effects assessment.

#### Baseline Methodology

11.3.6 An outline of the methodologies for the ecological survey work and study used to collect baseline condition information and to inform the scoping direction are described below, highlighting any limitations. Full methodologies are provided in **Appendix 11.1-Ecology Survey Results** (Doc Ref. 4.01.11a).

#### Desk Study

11.3.7 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:

- Multi Agency Geographic Information for the Countryside (MAGIC); and
- South East Wales Biodiversity Records Centre.

11.3.8 Further inspection of colour 1:25,000 OS base maps ([www.ordnancesurvey.co.uk](http://www.ordnancesurvey.co.uk)) and aerial photographs from Google Earth ([www.maps.google.co.uk](http://www.maps.google.co.uk)) was also undertaken in order to provide additional context and identify any features of potential importance for nature conservation in the wider countryside.

11.3.9 The following limitation to the desk study should be noted: The species data collated for the desk study is derived from records submitted by members of the public and from specialist volunteer group surveys. It does not represent a definitive list of species that occur in the local area, and the absence of records does not necessarily imply absence of such species.

11.3.10 Information on the presence of protected and notable species and statutory and non-statutory designated sites for nature conservation were returned within 2km of the site

boundary from the South East Wales Biodiversity Records Centre.

### Habitats

- 11.3.11 A field survey was conducted on 9<sup>th</sup> March 2020 of the habitats to the west of the A4226 on Oaklands and Pancross Farms, and at Redlands Farm on the eastern side of the A4226 on 8<sup>th</sup> December 2020. Additional habitat data was collected on 12<sup>th</sup> May 2021 during the optimal season for a detailed botanical assessment of habitats at Oaklands Farm. The Phase 1 field survey was conducted using the methodology outlined in the Handbook for Phase 1 Habitat Survey (JNCC 2010)<sup>12</sup>. Hedgerows were surveyed using the Hedgerow Evaluation and Grading System (HEGS)<sup>13</sup>. The hedgerows were also assessed against the Wildlife and Landscape criteria contained within Statutory Instrument No: 1160 – The Hedgerow Regulations 1997<sup>14</sup> to determine whether they qualified as ‘Important’ hedgerows under the Regulations.
- 11.3.12 Further botanical surveys were conducted of fields F10, F11, F5, F6, F7, F8 and F9 all within the Oaklands Farm area on 12<sup>th</sup> May 2021, to assess the condition of these habitats and to determine whether they were of sufficient botanical interest to be considered a priority habitat.

### Protected and Notable Species

#### Badger

- 11.3.13 A survey of the site for the presence of badgers was conducted on 9<sup>th</sup> March 2020 and 8<sup>th</sup> December 2020. As part of the survey all hedgerows, woodlands, scrub and other suitable habitats within the site and immediately adjacent to the site boundary, were searched for evidence of badger activity. The standard methodology was used, as outlined by Harris, Creswell and Jefferies (1991)<sup>15</sup>.

#### Bats

- 11.3.14 Tree assessments to identify Potential Roosting Features (PRF) for bats were undertaken from ground level, with the aid of a torch and binoculars (where appropriate). These surveys were undertaken on 9<sup>th</sup> March 2020 by a licensed/suitably experienced bat ecologist from FPCR, based on the P16, British Standard 8596:2015<sup>16</sup>. Trees present outside boundary features were targeted, as these had the most potential to be impacted by the then emerging design of the scheme. Hedges and other boundary features which contained likely bat potential trees were noted for future potential assessment if an impact was later deemed likely.
- 11.3.15 The suitability of bat habitat on site for commuting and foraging bats was assessed based on the Bat Conservation Trust guidelines (Table 4.1 and Table 3.4).

#### Birds

- 11.3.16 An initial bird scoping survey was conducted during the Phase 1 Habitat Surveys by a suitably experienced ornithologist to ascertain the sites’ potential to support breeding

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12 JNCC, (2010). Handbook for Phase 1 habitat survey – a technique for environmental audit, ISBN 0861396367.

13 Clements, D.K. & Tofts, R.J. (1992). Hedgerow Evaluation and Grading System (HEGS): A methodology for the ecological survey, evaluation and grading of hedgerows.

14 DEFRA, (1997). The Hedgerow Regulations 1997: A Guide to the Law and Good Practice. London, HMSO.

15 Harris, S., Cresswell, P. and Jefferies, D., (1991). (Report) Surveying Badgers. The Mammal. Society, Bristol.

16 BSI (2015). Surveying for Bats in Trees and Woodland – Guide. British Standards Institution. BS8596:2015, UK.

or overwintering bird species with an associated conservation status as WCA Schedule 1, NERC S41 species and/or BoCC Red or Amber list species. These species are likely to be of the greatest threat in relation to further decline and are commonly referred to as 'notable' species. This was followed up by a series of three breeding bird surveys (BBS) on 6<sup>th</sup> May 2020, 12<sup>th</sup> May 2021 and 24<sup>th</sup> May 2022 that specifically targeted ground nesting birds, namely skylark. The survey methodology employed was broadly based on that of territory mapping (Bibby et al., 2000)<sup>17</sup> as developed by the British Trust for Ornithology (BTO). Standard BTO species codes and symbols for bird activities were used to identify birds and denote activity, sex and age where appropriate. In 2022, the survey included the use of a thermal camera to aid in looking for skylark on the ground.

#### Great Crested Newts

11.3.17 Six waterbodies onsite were identified and assessed for their potential to support great crested newts using the Habitat Suitability Index. This was intended to be followed up with eDNA sampling of the most suitable waterbodies ponds P4 and P6, however in three consecutive years of 2020, 2021 and 2022 the ponds were dry at the time of survey in May.

#### Dormice

11.3.18 The suitability of the habitats onsite to support dormice was assessed as part of the Phase 1 Habitat Survey on 9<sup>th</sup> March 2020. Habitat suitability was then determined using the Dormouse Conservation Handbook and professional judgement.

#### Reptiles

11.3.19 As part of the Phase 1 Habitat Survey on 9<sup>th</sup> March 2020, habitats were scoped for the potential presence of reptiles and where appropriate relevant target notes were made.

#### Otter

11.3.20 During the Phase 1 Habitat Survey an assessment of the habitat present on site to support otter was conducted and where appropriate relevant target notes were made.

#### Consultation

11.3.21 Consultation responses were received between June and July 2021. Natural Resources Wales (NRW) were consulted on 15<sup>th</sup> June 2021. They responded on 17<sup>th</sup> June 2021 advising they will provide their response directly to the Planning Inspectorate and will therefore not be responding to the consultation.

11.3.22 The Council's Ecology Officer (in Vale of Glamorgan Council) were consulted on 15<sup>th</sup> June 2021, but no comments have been received in relation to the proposals.

#### Consultation Summary

11.3.23 It is agreed that ecological survey and assessment work is required for the proposal.

11.3.24 In terms of specific sites, it is considered this chapter should focus on the effects of the development on the Sites of Importance for Nature Conservation (SINC's) adjoining the perimeter of the site and the Nant Whitton Woodlands Site of Special Scientific

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<sup>17</sup> Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000). Bird Census Techniques, 2nd Edition. Academic Press, London.

Interest, which is in very close proximity to the site.

11.3.25 In terms of impacts this proposal has on individual species, it is considered this chapter should focus on the potential impact on bat populations arising from the proposals, and the impact of the proposal on potential otter and dormouse habitat.

11.3.26 It is considered a robust scheme of biodiversity enhancement should be provided to mitigate any potential effects on biodiversity and to ensure a biodiversity net gain.

**Scoping Direction**

11.3.27 An EIA Scoping Direction was returned from the Planning Inspectorate on 28<sup>th</sup> July 2021. Ecology was scoped in and required to provide a standalone chapter in the EIA. Those aspects of the Scoping Direction that are relevant to this chapter are summarised in **Table 11.1**.

**Table 11.1: Summary of Scoping Direction**

Issue	Comment
Overall approach to ecological assessment	Inspectorate considers that where protected species are within the scope of the ES, further survey work cannot be ruled out at this stage. The applicant should strive to reach an agreed approach to further assessment to inform the ES with NRW.
Great Crested Newts (GCN)	GCN surveys should be undertaken in accordance within a 500 m radius of the site boundary and the ES should assess any likely impacts on GCN and the potential for suitable mitigation. The applicant is encouraged to liaise with NRW as appropriate.
Bats	The approach to the assessment of impacts on bats set out in the Scoping Report is considered largely appropriate. The applicant's attention is drawn to the need to ensure that surveys should cover all trees with the potential to support bats that could be affected.
Dormouse	The applicant's attention is drawn to comments received from NRW in this respect and the Inspectorate's comments to reach an agreed approach with NRW.
Otter	The applicant's attention is drawn to comments received from NRW in this respect and the Inspectorate's comments to reach an agreed approach with NRW.
Nant Whitton Woodlands SSSI	NRW suggests that the Nant Whitton, which runs through the Nant Whitton Woodlands SSSI should be scoped into the assessment of local water courses. Given the potential for changes in the watercourse to affect the SSSI, the Inspectorate agrees with NRW. The Nant Whitton should be

	included in the ES assessment of impacts on local watercourses and the SSSI.
Barry Woodlands SSSI	The applicant's attention is drawn to comments received from NRW regarding the path of the River Waycock through the Barry Woodlands SSSI. Given that potential link, the ES should incorporate a proportionate level of assessment in this respect, with reference to appropriate mitigation and avoidance measures
Local Watercourses	The applicant's attention is drawn to comments received from NRW in relation to the potential for impacts on local watercourses arising during the construction phase. The applicant is reminded that, as set out above, construction and decommissioning phase impacts should be assessed in the ES as appropriate.

**Assigning Ecological Importance**

11.3.28 Under the CIEEM guidance (2018), EclA should classify "Important Ecological Features" in terms of a geographical frame of reference. This assessment used Sub-Local, Local, County, Regional, National, European & International geographical categories.

11.3.29 It is not possible for there to be a fully standardised and agreed upon measure for the different geographical levels, due to the inherent variability within ecosystems. There are, however, widely understood hierarchies within a finite number of value-measures that are used by ecologists to make an informed professional judgement. The value-measures include rarity, size of population, conservation status, legal protection, site designation status and ecological function. Important features for this assessment were those considered of local importance or above. These were judged based on **Table 11.2**.

**Table 11.2: Geographical Frame of Reference for Ecological Features**

Geographical Frame of Reference	Typical Descriptors
European/International	High to very high importance e.g. European/international protected sites (SACs, SPAs, Ramsar) Internationally important populations (1%+ of population)
National /Regional	Medium to high importance e.g. Nationally Protected Sites (SSSIs, NNRS) Nationally Important Populations (1%+ of national population) Nationally Rare species IUCN England (CE)

County	<p>Medium importance  e.g. County Wildlife Sites  Local Nature Reserves  County Important Populations (1+ of county Population)  Nationally Scarce Species  Minimum level for European Protected Species (EPS)  Minimum level for full Section 5. WCA Species (WCA)  Minimum level for Schedule 1 breeding birds (WCA Sch. 1)  County rare species and certain notables  IUCN England (EN)</p>
Local	<p>Low importance  e.g Other Local Wildlife Sites  Minimum level for NERC Section 41 Habitats and Species  Minimum level for BoCC Amber and Red Species of Bird  Minimum level for badger  Minimum level Section 5 WCA killing and injury only</p>
Sub - Local	<p>Very low importance  All other species</p>

11.3.30 The sensitivity of a receptor is based on the importance of the receptor and structured around the geographical frame of reference using the criteria below in **Table 11.3**.

**Table 11.3: Degrees of Sensitivity Criteria**

Sensitivity	Typical Geographical Frame of Reference	Criteria
High	European/International National /Regional	The receptor/resource has little ability to absorb change without fundamentally altering its present character or is of international or national importance.
Medium	County	The receptor/resource has moderate capacity to absorb change without significantly altering its present character or is of high and more than local (but not national or international) importance.
Low	Local	The receptor/resource is tolerant of change without detrimental effect, is of low or local importance.
Negligible	Sub-Local	The receptor/resource can accommodate change without material effect, is of limited importance.

Magnitude of Impact

11.3.31 Once importance was established, an “Assessment of Significant Effects” was undertaken to determine whether or not the important ecological features were subject to impacts by the proposals. This was done through a process of characterisation of both the impact and overall effect on a feature, by applying a predicted impact magnitude. This assessment applied magnitude criteria as described in **Table 11.4**.

**Table 11.4: Magnitude of Effects and Criteria**

Magnitude of Effect	Criteria
High	Total loss or major/substantial alteration to elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.
Medium	Loss or alteration to one or more elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.
Low	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but the underlying character/composition/attributes of the baseline condition will be similar to the pre-development.
Negligible	Very little change from baseline conditions. Change not material, barely distinguishable or indistinguishable, approximating to a ‘no change’ situation.

Significance of Effects

11.3.32 The next stage of the Assessment of Significance of Effects is to combine importance and magnitude. For this assessment, the significance of the effect was determined using the matrix below (**Table 11.5**). This was carried out separately for construction, operation and decommissioning phases for each important ecological feature and identified impact. In addition, effects were assessed as being either adverse (negative) or beneficial (positive); direct or indirect; and to occur at a scale that is either short, medium or long term.

11.3.33 Where the matrix shows more than one significance option, professional judgement was used to decide which option was most appropriate based on best practice and policy objectives in line with the pertinent policies and guidance described in Section 11.2.

**Table 11.5: Significance of Effects**

		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Magnitude of Effect	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor/Moderate	Negligible
	Low	Moderate	Minor/Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible



11.3.34 If a potential effect resulting from or to the proposed development is classified as either moderate or major, it is considered significant in terms of the EIA Regulations. As such further mitigation and/or management measures are then prescribed to reduce/offset these to acceptable levels, ensuring that the proposed development meets national and local planning policy (by avoiding 'significant harm to biodiversity'). Significance of effects will be considered before and after mitigation.

11.3.35 The following terms have been used to define the significance of the effects identified with respect to Ecology and Biodiversity:

- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- Moderate: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

#### Limitations of the Assessment

11.3.36 The following assumptions and limitations are relevant to this ES chapter:

- The ecological surveys are limited by factors which affect the presence of species such as the time of year, weather, migration patterns and behaviour. The ecological surveys used to inform this assessment have not therefore produced a complete list of plants and animals present in the study area and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present. However, the results of these surveys are considered to be sufficient to undertake this assessment.
- The precautionary principle has been applied, whereby mitigation/compensation measures are provided to avoid/minimise the risk of any potentially adverse impacts. Based on this approach, none of the limitations outlined above or in the relevant survey report in the appendix are considered significant in terms of the assessment of effects.

#### 11.4 BASELINE CONDITIONS

11.4.1 The following sections detail the existing ecological features and conditions currently present within the Application Site. Full details of the survey results are provided in **Appendix 11.1** (Doc Ref. 4.01.11a).

11.4.2 Based on the timeframe of the assessment and the planned construction programme, the baseline ecological features identified and detailed in the sections below are not expected to change significantly within the period prior to the proposed development taking place.

#### Designated Sites

11.4.3 **Table 11.6** below summarises the statutory designated sites within the Zol of the

proposed development.

**Table 11.6: Statutory Designated Sites within the ZOI**

Site Name	Proximity to Site (approximate)	Description and Ecological Importance
Nant Whitton Woodlands Site of Special Scientific Interest (SSSI)	200m south west of Oaklands Farm area	22.2 hectares of narrow strip of sloped woodland. Primarily ash and oak, with hazel, maple, spindle, wayfaring tree and other native shrubs.  <b>National</b> importance
Ely Valley SSSI	2.5 km north of Redlands Farm Area	87 hectares alongside the River Ely. Contains large number of the rare plant, wolfsbane <i>Aconitum anglicum</i> .  <b>National</b> importance
Pysgodlyn Mawr SSSI	4.5km north west of the Pancross Farm area	Small wetland, 4.1 hectares, that supports a sequence of habitats, ranging from open water and reed swamp to acid bog and heath.  <b>National</b> importance
Fferm Walters SSSI	4.7km south east of Oaklands Farm area	An exceptionally large area, 24.87 hectares, of species-rich neutral grassland. The grassland is associated with woodland, hedgerows, scrub and smaller areas of damp grassland.  <b>National</b> importance
Coedydd Y Barri/ Barry Woodlands SSSI	4.8km south east of Oaklands Farm area	120 hectares of semi-natural broadleaved woodland. Comprises of fourteen separate woodland blocks.  <b>National</b> importance
Severn Estuary Ramsar and SPA	9.8km to south east of Redlands Farm area	The larger area of the Severn Estuary with second largest tidal range in the world. Unique estuary habitat that covers the mouths of four major rivers (the Severn, Wye, Usk and Avon) and lesser rivers. The intertidal zone is one of the largest and most important in Britain. Supports large populations of migratory fish (e.g. salmon <i>Salmo solar</i> ), wintering and wading birds (e.g. ringed plover <i>Charadrius hiaticula</i> ).  <b>International</b> importance

11.4.4 **Table 11.7** below provides a summary of the non-statutory designated sites within the Zol of the proposed development.

Table 11.7: Non-Statutory Designated Sites within the ZOI

Site Name	Site Reference	Description and Ecological Importance
Land along Nant Llancarfan Site of Importance for Nature Conservation (SINC)	SINC No. 216, 33-G3	20m south-west of Oaklands Farm. A complex of fen and other mire communities split across three fields with mature hedgerows separating the three units. Priority habitats include scrub, wet grassland, purple moor-grass and rush pastures, and lowland fens. <b>Local</b> importance
West of Coed Quinnet SINC	SINC No. 219, 33-W4	180m south-west of Oaklands Farm. Large field of damp semi-improved grassland with clumps of bramble and young ash. Occasional semi-mature ash and English oak. Priority habitats include grassland, hedge, and wood pasture. Brown hare have been observed on site and the habitat appears to offer excellent bat foraging potential. <b>Local</b> importance
North of Coed Quinnet SINC	SINC No. 218, 33-G1	0m north of Oaklands Farm. As above. <b>Local</b> importance
Coed Quinnet SINC	SINC No. 218, 33-G1	0m south of Oaklands Farm. As above. <b>Local</b> importance
Land south of Blackland Farm SINC	SINC No. 220, 33-W5	210m south-east of Oaklands Farm. A fen meadow with semi-natural broadleaved woodland. The site lies immediately adjacent to a large block of SSSI woodland. Priority habitats include wet grassland, broadleaved woodland, and purple moor-grass fen meadow. Woodland offers good dormouse habitat. <b>Local</b> importance
Land north of Whitton Rosser Farm SINC	SINC No. 222, 33-W6	380m south-east of Oaklands Farm. Small woodland with good botanical and structural diversity. Priority habitats include scrub and native woodland offering excellent dormouse habitat. <b>Local</b> importance
Land north of Little Hamston Farm SINC	SINC No. 226, 34-W4	800m south of Redlands Farm. Three small degraded broadleaved woodlands linked by a wooded stream. Dominant species include ash, field maple, and hazel. There is good potential for habitats to support both bats and dormouse. <b>Local</b> importance
Land north of Coed y Cwm	SINC No. 279, 41-G9	1.4km south of Oaklands Farm. Two large sections of valley woodland fully fenced and ungrazed. A stream runs through the eastern section. Priority habitats include broadleaved native woodland and lowland meadow offering excellent dormouse habitat. <b>Local</b> importance
Coed y Graig SINC	SINC No. 225, 34-W3	780m south-east of Redlands Farm. Medium-sized mixed woodland consisting of sitka spruce, ash, and wych elm. Open structure and fairly damp, thicker bramble to the south. <b>Local</b> importance

Coed Sion Hywel SINC	SINC No. 224, 34-W2	192m south-east of Redlands Farm. Large woodland, part native deciduous, part mixed plantation, and part beech plantation. High value dormouse habitat in places. <b>Local</b> importance
Brook Wood SINC	SINC No. 223, 34-W1	0m south of Redlands Farm. Woodland with a stream along the northern boundary. Low value dormouse habitat but bat roost potential in larger trees. <b>Local</b> importance
Betty Lucas Wood SINC	SINC No. 174, 25-W3	0m south of Redlands Farm. Mid-size broadleaved woodland bordered on the north and south by ditches. Several shallow pits to the centre and west. Less coppice structure and damper to the east. Priority habitats include native mature woodland, poor dormouse habitat but good roosting potential for bats. <b>Local</b> importance
Coed y cwm SINC	SINC No. 175, 26-W1	0m northeast of Redlands Farm. Linear broadleaved woodland divided to the east by a track. Western two-thirds on a steep north slope and eastern third centred on a small stream. <b>Local</b> importance
Land south of Ty'n-y-Coed SINC	SINC No. 217, 33-W3	0m south of Pancross Farm. Small broadleaved woodland with areas of tall herbs and scrub. Broad and shallow wood bank and ditch present. Moderate dormouse habitat. <b>Local</b> importance
Redland Wood SINC	SINC No. 173, 25-W2	0m north of Pancross Farm. Medium size woodland with waterlogging in places and several small streams run through. Priority habitat of native broadleaved woodland. <b>Local</b> importance
Land along River Waycock	SINC No. 176, 26-W6	18m southeast of Redlands Farm. Small copse managed for pheasants. Oak and ash present with dense and diverse understorey. Stream on north side and good dormouse habitat. <b>Local</b> importance
Amelia Trust Woodland Pond SINC	SINC (no reference number available)	135m southeast of Oaklands Farm. Located on a donkey sanctuary, a small pond situated in broadleaved woodland. <b>Local</b> importance
Amelia Trust Dew Pond	SINC (no reference number available)	254m south of Oaklands Farm. Located in a donkey sanctuary, a small pond situated near farmhouses and agricultural land. <b>Local</b> importance
Coed y Lan	SINC No. 172, 25-W1	175m northwest of Pancross Farm. Mature broadleaved woodland with some open areas. Stream runs through the middle, good quality dormouse habitat. <b>Local</b> importance
Land south of Blackland Farm	SINC No. 220, 33-W5	210m southeast of Oaklands Farm. Triangular fen-meadow with semi-natural broadleaved woodland fringe on northern and

		eastern edges. Priority habitat includes wet grassland, native woodland, and fen meadow. Possibility to support interesting and diverse invertebrate populations, and good dormouse habitat. <b>Local</b> importance
Land northwest of Whitton Rosser Farm	SINC No. 222, 33-W6	380m southeast of Oaklands Farm. Small woodland on abandoned ground which has developed into secondary woodland. Good botanical and structural diversity. Several large English oaks on site. Excellent dormouse habitat. <b>Local</b> importance
Land north of Llanvithyn Farm	SINC No. 214, 33-W1	1090m southwest of Pancross Farm. Small section of a larger woodland block, relatively species-rich and fenced. A stream runs through the wood and flat areas are very waterlogged. Moderate dormouse habitat. <b>Local</b> importance
Coed Arthur	SINC No. 212, D32 W1	1140m west of Pancross Farm. Extensive area of forestry comprising mainly broadleaved woodland and conifer plantation. Patchy ground flora but Bluebell present throughout, other notable species include thin-spiked wood-sedge, wood anemone, and wood millet. <b>Local</b> importance
Northwest of Garnllwyd Farm	SINC No. 215, 33-W2	1190m southwest of Oaklands Farm. Small broadleaved woodland with steep south easterly aspect. Moderate dormouse habitat. <b>Local</b> importance
Log Wood	SINC No. 170, 25-7-W2	1430m north of Pancross Farm. Block of semi-natural woodland along the line of a small stream. Raised ground supports beech and ash and below are hazel stools and tangles of bramble. Dead wood left to decay in situ. <b>Local</b> importance
Gaer Wood	SINC No. 169, 25-5-W1	1522m north of Pancross Farm. Hilltop woodland overlying an archaeological monument. Generally mixed broadleaved woodland with mature trees. Ash dominates the older parts with silver birch. Understorey is variable but older area have abundant hazel stools with holly and wych elm. Two ponds to the north, completely overhung by vegetation. <b>Local</b> importance

### Habitats

11.4.5 The Site is formed by three farms, Oaklands, Pancross and Redlands, each with differing management practices which has influenced the habitat types found. Fields, hedges, woodlands and trees assessed for bat potential have been labelled on the phase 1 plans for each three areas, and numbered target notes have been applied to certain habitats and features on site where more detail has been provided (Figure 3, Figure 4, Figure 5 and Figure 6). Full habitat descriptions and photographs are also provided in **Appendix 11.1**.

#### Arable

11.4.6 Fields F1 to F4 at Pancross Farm (DA1) are large arable fields that had been sown with a perennial ryegrass *Lolium perenne* silage crop.

11.4.7 This habitat is of **Sub-Local** importance.

#### Improved Grassland

11.4.8 A total of 8 fields within the overall site boundary were categorised as improved grassland, on account of their low botanical species richness, dominance of grass species and agricultural modification including grazing and nutrient enrichment. These fields were F5 to F8 and F12 at Oaklands and F13 at to F15 at Redlands.

11.4.9 This habitat is of **Sub-Local** importance.

#### Semi-improved Neutral Grassland

11.4.10 F10 and F11 at Pancross were assessed as being semi-improved grassland on account of species richness and that they showed signs of being less intensively managed in recent years. The grassland was assessed as being an example of the National Vegetation Classification habitat MG6. This habitat is not a Priority Habitat, however, species-rich examples with a significant number of lowland grassland indicator species can be considered candidates for designation in Wales as an SINC.

11.4.11 This habitat is of **Local** importance.

#### Poor Semi-Improved Neutral Grassland

11.4.12 Fields F9 (Oaklands), F16 and F17, as well as part of F15 within Redlands (TN20) and patches of grassland at Pancross TN4 and Oaklands TN11 were classified as poor semi-improved neutral grassland.

11.4.13 This habitat is of **Sub-Local** importance.

#### Marshy Grassland

11.4.14 Areas of rush dominated grassland were present at Oaklands in both fields F8 and F9. F8 was heavily poached and of low botanical diversity, whilst F9 appeared less intensively grazed and was slightly more diverse.

11.4.15 This habitat is of **Local** importance.

#### Woodland

11.4.16 Mature mainly sessile oak *Quercus petraea* broadleaved woodland and wooded watercourse corridors formed much of the site's boundaries. Small sessile oak and ash woodland were also present. There were fifteen areas of woodland in total (W1 – W15) within the site boundary bordering all three farm areas. Further details of these woodlands are given in Appendix 11.1.

11.4.17 This habitat is of **Local** importance.

#### Mature Trees and Tree Lines

11.4.18 Along the track along the northern boundary of Oaklands between TN6 and TN7 were 31x mature trees, many on which were located just within the verge between the track and the established hedges. Apart from a single ash *Fraxinus excelsior*, these were all sessile oak. Three semi-mature ash were located centrally within F10 at TN8. The

eastern farm contained 26x mature trees (T1 to T26) located centrally in fields. Aside from a single ash, these were also all mature sessile oak.

11.4.19 This habitat is of **Local** importance.

#### Hedgerows

11.4.20 There was a total of 27 hedges across the site, 18 of which (66%) were high value under the HEGs assessment criteria. Further details and photographs of the hedgerows are provided in the Ecology Survey Results Report in **Appendix 11.1**.

11.4.21 This habitat is of **County** importance due to the large proportion of hedgerows within the site which are of high value.

#### Scrub

11.4.22 At Redlands a centrally located fenced patch of bramble, elder and hawthorn scrub located within a damp sump was present at TN12. The remainder of the scrub on site was limited to patches along tree lines and patches at TN11 and TN15 at Oaklands.

11.4.23 This habitat is of **Sub-Local** importance.

#### Ponds

11.4.24 There are a total of 6 ponds within the site assessment area P1 to P6. P 1, 2, 4 and 6 are within the Redlands area, P5 is in the Oaklands area and P3 is within the Pancross area. At the time of the Phase 1 Habitat Survey the water table was very high and all ponds, with the exception of P3 (a slurry pit), were ephemeral. Most of the ponds on site do not support aquatic vegetation and in 2020, 2021 and 2022 they were all dry by May. They are therefore considered of low value and do not constitute priority habitat.

11.4.25 This habitat is of **Local** importance.

#### Watercourses

11.4.26 Two wooded streams form boundaries at TN2 and TN3 at Pancross. These are headwaters of the river Llancarthan. Woodland ground flora is present along the banks. There was a flowing straightened watercourse along H11 and H17 at Oaklands. A 550m section of the River Waycock runs along the southern boundary along the edge of W12 at Redlands. The river is fenced from site and located within mature woodland. At TN15 was a narrow (less than 1m wide) section of stream fed by ephemeral boundary ditches that emerged towards the southern end of the line of trees TN14 at Redlands. It was fenced on both sides creating an ungrazed area approximately 7m wide. This narrow stream continued along the edge of W11, before entering the river Waycock at the southern end of H25. Another tributary of the Waycock enters the river in the southeast corner of the Redlands site. It is fed by a small stream along the edge of W15 and flowing ditches along H28, H26 and TN21.

11.4.27 This habitat is of **Local** importance.

#### Protected Species

##### Badger

11.4.28 No badger setts or evidence of badger were recorded during the surveys and therefore they are considered to be highly likely to be absent from the site and are not considered

further in this report.

#### Bat Roosts

11.4.29 There were numerous mature trees across the site with low to high bat potential within lines of trees, hedgerows, and woodlands across the site. These are all being retained within the proposals and so no further assessment was necessary and they will not be considered further in this report.

11.4.30 A single ruined old stone building was present on the eastern edge of the Redlands site (B1). The barn had no roof. The thickness of the walls and the numerous cracks and cavities offer potential for crevice dwelling bat species. The building is being retained on the edge of site so no further surveys were required and will not be considered further in this report.

#### Bats

11.4.31 A total of 22 records of bats were returned from within 2km of the Site during the desk study. The 256 confirmed species recorded were common pipistrelle, soprano pipistrelle, noctule, brown long eared, serotine and lesser horseshoe (three records), along with species of the genus *Myotis*.

11.4.32 The habitat on site had a high degree of connectivity along woodland edge, hedgerows, tree lines and river corridors, and it is well connected with the wider landscape including high value neighbouring ancient woodland. Foraging opportunities also exist along the woodland edges and watercourses. The habitat onsite is of high suitability for bats.

11.4.33 South Wales forms part of the core UK area for two of the UK's rarer bat species lesser and greater horseshoe bats, and suitable habitat for both species is present across the site. Western Barbastelle are also likely to be present given the nearby ancient woodland resource.

11.4.34 Given the extent of the area, its geographical location and the high habitat quality, the Site is considered of **National/ Regional** importance for bats.

#### Birds

11.4.35 9 protected species under Schedule 1 of the WCA were returned following consultation with SEWBRC within 2 km of the survey area. Of these species only one was recorded on the site during bird scoping surveys, red kite, with all records being flyovers. The species is known to breed locally in plantation and native woodland.

11.4.36 The site supports high suitability breeding and foraging habitat for birds including woodland, standalone trees, hedgerows, scrub, semi-improved meadows, waterbodies and structures including a ruined building and pylons. Overall, the intensively managed improved grassland fields at the site are of low suitability to breeding birds.

11.4.37 A total of 55 species were recorded across the bird scoping surveys, of which 26 amber or red listed species. The majority of bird species recorded were noted from site and field boundary features, including hedgerows and woodland which have high suitability to support breeding birds. Species recorded along these features were displaying breeding behaviour such as singing, carrying food or nestbuilding. Species such as



skylark, meadow pipit and gulls were recorded from central field parcels, foraging or in the case of skylark, displaying breeding behaviour. The remaining species records were flyovers for species including swift, swallow and buzzard.

11.4.38 Skylark were the only notable breeding species recorded within the proposed works areas, that utilise these grassland habitat types for breeding. A detailed survey for skylark was undertaken in Spring 2022 (April 24th) to assess their breeding extent across the Site. No singing males were recorded from the Oaklands Farm and Redlands Farm areas of the site where panels will be installed, with all breeding activity limited to the large central field (F4) at Pancross Farm. This is typical of preferred skylark breeding habitat in large fields. Two pairs were confirmed to be breeding in F4.

11.4.39 The site is considered of **Local** importance for birds.

#### Dormice

11.4.40 There were no records of dormice within 2km of the Site returned during the desktop study; however, the distribution of dormice in South Wales is not complete enough for the lack of records to be significant, and populations are known to be present across the region.

11.4.41 The proximity of high suitability woodland habitats adjacent to the site, and the wooded corridors and hedgerows are optimal for dormice. The presence of dormice of site is considered highly likely. Given the extent of suitable and connected dormice habitat present, presence has been assumed within all boundary features. The Site is considered of **County** importance for dormice.

#### Great Crested Newts

11.4.42 The closest Great Crested Newt (GCN) record to site in the last 10 years was 980m north of Pancross. Prior to 10 years the closest was 862m north of Pancross.

11.4.43 Of the 6 ponds within the site, the HSI calculations returned results for P3 of unsuitable (due to it being an active slurry lagoon), P1, P2, P4 and P6 were poor and P5 was considered of below average suitability. The ponds were dry in May 2020, 2021 and 2022, and no eDNA surveys were possible.

11.4.44 Overall, the habitats present within the site are considered sub-optimal for GCN, and they are presumed absent from the site and are not considered further in this report.

#### Reptiles

11.4.45 Three records of grass snake were returned from within 2km of the Site.

11.4.46 No suitable habitat was present for the EPS reptiles smooth snake and sand lizard, nor was there suitable habitat for adder on site. Habitat suitable for common reptiles was restricted to areas fenced outside of grazing enclosures, within the base of hedges/verges and along woodland edges. The management and grazing of the central field areas make them sub-optimal for reptiles for hibernation and reproduction. There is potential foraging habitat during the active season for reptiles within the semi-improved grassland fields at Oaklands (F10 and F11) prior to cuts, and within peripheral habitats on the edges of the fields (e.g. TN11) particularly where fenced. The habitat on site is sub-optimal for supporting a large and significant reptile population. It is, however, likely to support small, localised populations, and it is considered of **Local**

importance.

#### Otter

- 11.4.47 No records of otter were returned from the desk study and no evidence of otter was found on site. Otter are known to be present in the wider area and are now present in most of South Wales water courses.
- 11.4.48 The River Waycock which lies adjacent to the south boundary and the Nant Llandcarfan which is 31m west of the site are highly likely to support otter. The streams along TN3 and TN2 and the connecting watercourses in the east of the site along W11/H25 and along W15 and TN20/21, are also likely to form part of an otter territory. Otter are likely to be present in suitable riparian habitats surrounding the site boundary and may occasionally utilise waterbodies within the site boundary areas.
- 11.4.49 The site is of **County** importance for otter as they are fully protected under Schedule 5 of the WCA.

### 11.5 PROPOSED DEVELOPMENT

- 11.5.1 Full details of the proposed development are provided in Chapter 3. What follows is an outline of the key aspects of the proposed development that relate to the EIA assessment for Ecology and Conservation receptors.
- 11.5.2 The proposed development is for the construction, maintenance and decommissioning of a ground mounted solar farm and Battery Energy Storage System (BESS), plus ancillary infrastructure. The panels will be arranged in rows in an east-west alignment across the plots and orientated south. The height of the panels will be approximately 3m above ground level; the lowest part of the panel will measure approximately 0.9m above ground level. The rows of panels will be set approximately 3.2m apart to avoid shadowing and allow for scheduled maintenance, this will be dependent on local topography. The placement of the panels will therefore allow for sufficient light and space between and beneath the panels to retain existing areas of grassland.
- 11.5.3 The mounting frames for the panels will be fixed to the ground employing a pile mounting system using a mobile piling rig, depending on ground conditions.
- 11.5.4 The development plots will be secured by up to a 2m high stock fence or similar with wooden posts. Infra-red (non-visible at night), inward facing pole mounted CCTV cameras (c. 2.5m – 3m in height) will also be provided at between 50m and 100m intervals along the boundary fence.
- 11.5.5 Access to the application site during the construction period will be off Five Mile Lane, utilising the existing site accesses to the proposed set down areas.
- 11.5.6 The construction of the solar farm is expected to last approximately 6months and employ up to 80 staff over the construction period. The scheme will be operational for 40 years after which all equipment will be removed from site.
- 11.5.7 The scheme retains all existing trees and hedges, and all retained boundary features and trees will be buffered between the stock fence and the feature.
- 11.5.8 The scheme also includes a number of enhancement measures that will be implemented within the site during the operational phase of the scheme. These enhancement and management prescriptions are described below for each of the

three Development Areas (DA's) and have been designed to provide ecological enhancements only (they do not constitute mitigation or compensation measures).

11.5.9 Enhancement measures at Oaklands Farm (DA3):

- The panel areas of the three most western fields which support the current higher levels of botanical interest will be placed into a conservation grazing regime, with low stock density utilising conservation sheep species such as Herdwicks.
- Low interest panel fields will be grazed in rotation normally to form a tussocky grassland sward.
- The buffer zones of the higher interest fields will be placed into a meadow management style regime, with two cuts annually, one in early April and the other in late August to preserve the existing botanical interest.
- The remaining buffer areas of all fields will be sown with locally sourced native wildflower meadow seed mix or green hay in autumn and then be managed with a meadow cut regime.
- A mix of 10 suitable bat and bird boxes should be placed on boundary trees to provide roosting and nesting opportunities for these species.

11.5.10 Enhancement measures at Pancross Farm (DA1):

- Areas with panels will be grazed normally with sheep, which will improve the diversity of the existing *Lolium* monoculture sward.
- The external buffer zones between deer fencing and site boundary features will be cut and collected 5 times in the first year of creation and then be sown with locally sourced native wildflower meadow seed mix or green hay in autumn and then be managed with a meadow cut regime twice annually, once in early April and again in late August.
- A total of 7 new native hedgerows with trees will be planted within the western half of the scheme to create new hedgerow habitat and provide additional connectivity with existing hedgerows and woodland along the site boundaries.
- A mix of 25 suitable bat and bird boxes should be placed on boundary trees to provide roosting and nesting opportunities for these species.

11.5.11 Enhancement measures at Redlands Farm (DA2):

- Areas with panels will be grazed normally with sheep, which will improve the diversity of the existing *Lolium* monoculture sward.
- New native hedgerow planting to achieve “gapping up” will be implemented on all existing hedgerows.
- New native hedgerow and tree planting will be included to create hedgerows along existing lines of trees along the northwest boundary. This will create 2 new hedgerows providing additional habitat and connecting existing woodland and hedgerows.
- Buffer zones around the site periphery will be enhanced through native scrub planting and higher diversity grassland creation. Native scrub species will be planted adjacent to boundary woodland and scrub and grassland will be sown with locally sourced native wildflower meadow seed mix or green hay in autumn and then be managed with a meadow

cut regime twice annually, once in early April and again in late August. These areas will be fenced off from livestock.

- A mix of 25 suitable bat and bird boxes should be placed on boundary trees to provide roosting and nesting opportunities for these species.

## 11.6 ASSESSMENT OF EFFECTS

### Designated Sites

11.6.1 Of the statutory sites identified within the Zol of the scheme, none are considered likely to be affected by the scheme due to their significant distance from the site and the nature of the proposed works being unlikely to generate effects over these distances. The closest statutory designated site is the Nant Whitton Woodlands Site of Special Scientific Interest (SSSI) which lies approximately 200m south west from the Oaklands site boundary. Works are not anticipated to affect this woodland either directly or indirectly and the magnitude of effect is therefore not applicable.

11.6.2 There are a total of 26 non-statutory designated sites within the Zol of the scheme. Notably, the site sits on the North of Coed Quinnet SINC, Coed Quinnet SINC, Betty Lucas Wood SINC, Coed y cwm SINC, Land south of Ty'n-y-Coed SINC, Redland Wood SINC and Brook Wood SINC. Whilst these SINC sites are located immediately adjacent to the site boundary of the scheme they are all designated for the presence of woodland and semi-improved grassland habitats which will not be affected by the installation of the solar panels either directly or indirectly. The magnitude of effect on these non-statutory designated sites is therefore not applicable.

### Habitats

11.6.3 All of the existing areas of woodland, scrub, hedgerows, trees, ponds and watercourses within the site boundary will be retained throughout the construction, operational and decommissioning stages of the scheme. There are anticipated to be no impacts either directly or indirectly on these habitats and therefore the magnitude of effect is **negligible**.

11.6.4 Some of the existing areas of arable land, improved grassland, semi-improved neutral grassland, poor semi-improved neutral grassland and marshy grassland will be lost as a result of the installation of solar panels within the fields. These habitats are all of local or sub-local importance in terms of their ecological value. It is considered that there will be sufficient areas of these grassland habitats remaining in the buffer zones and between the panels within the fields that the underlying character of the baseline condition will not be significantly altered. In addition, the enhancement measures to improve the grassland habitat in the buffer zones and sympathetically manage the retained grassland around the site are expected to improve the habitat value of the grassland. Therefore, the magnitude of effect is expected to be **low**.

### Protected Species

#### Bats (foraging and community)

11.6.5 The existing habitat on site has a high degree of connectivity along woodland edge, hedgerows, tree lines and river corridors for foraging and commuting bats, for which the site has national/ regional importance. These habitats will all be retained in their entirety throughout the scheme, with buffer zones implemented around these habitat

features and therefore the habitat quality and connectivity for foraging and commuting bats will be unchanged by the scheme. No lighting is required as part of the scheme once operational. Foraging and commuting bats are therefore not anticipated to be affected by the scheme either directly or indirectly. The magnitude of impact is **negligible**.

#### Birds

- 11.6.6 All habitats of high suitability to breeding birds at the site will be retained. Improved grassland areas will overall be enhanced through management that provides higher suitability foraging habitat for birds. The enhancement of buffer zones adjacent to retained habitats with grassland meadow sowing, scrub and tree planting and new hedgerow planting will overall improve the value of the site to birds post development.
- 11.6.7 The use of F4 at Pancross by skylark for low numbers of breeding skylark is directly related to its current management and the breeding success of skylark is therefore limited by the current management regime. The two breeding pairs were recorded at the highest point of the field, which will be a proposed buffer zone post development. The more suitable management of grassland between the panels and the high suitability of buffer zones post development will likely have an overall negligible effect on the local skylark population post development.
- 11.6.8 The magnitude of effect is therefore **negligible**.

#### Dormice

- 11.6.9 Whilst the presence of dormice on site is considered highly likely and the site has county importance for the species, the scheme is not anticipated to impact on dormice either directly or indirectly. This is due to the retention of all trees, hedgerows and areas of woodland within the site throughout the scheme and the implementation of buffer zones and enhancement measures such as gapping up of existing hedgerows, in this way the habitat suitability and connectivity for dormice will be retained and enhanced. The magnitude of effect is therefore **negligible**.

#### Reptiles

- 11.6.10 The habitats on site are considered likely to support small, localised reptile populations, and the site is considered of local importance for the species. The retention of habitats on the site including the buffer zones and grassland areas between the panels and the enhancement measures to improve the grassland habitat and sympathetically manage the retained grassland are expected to improve the habitat value of the grassland for reptiles. The magnitude of effect is therefore **negligible**.

#### Otter

- 11.6.11 Otter are presumed to be present on site within the suitable streams and the River Waycock. The watercourses within the site will not be directly affected by the proposed scheme and buffer zones will be implemented around the watercourses which will ensure no indirect impacts on otter. The magnitude of effect is therefore **negligible**.

### 11.7 PROPOSED MITIGATION

- 11.7.1 No specific mitigation has been proposed for the scheme. It is considered that the scheme will have minimal impacts on the ecological features identified within the ZOI in the absence of mitigation measures and therefore specifically designed measures

are not required to be implemented.

- 11.7.2 The enhancement measures listed for each of the three Development Areas within the site boundary in Section 11.5 above, are anticipated to improve the condition of retained habitats within the site.

## 11.8 SUMMARY OF PREDICTED EFFECTS

- 11.8.1 The table below details the summary of the predicted effects of the scheme on each ecological feature identified within the Zol of the scheme.

**Table 11.8: Summary of Predicted Effects**

Ecological Feature	Value/ Sensitivity of Feature	Description of Impact	Duration of Impact (Short/ Medium/ Long Term)	Magnitude of Impact (Without Mitigation)	Significance of Effect	Significant/ Not Significant
Severn Estuary Ramsar	International	None	N/A	N/A	N/A	Not significant
Nant Whitton Woodlands SSSI	National	None	N/A	N/A	N/A	Not significant
Ely Valley SSSI	National	None	N/A	N/A	N/A	Not significant
Pysgodlyn Mawr SSSI	National	None	N/A	N/A	N/A	Not significant
Fferm Walters SSSI	National	None	N/A	N/A	N/A	Not significant
Coedydd Y Barri/ Barry Woodlands SSSI	National	None	N/A	N/A	N/A	Not significant
Land along Nant Llancarfan SINC	Local	None	N/A	N/A	N/A	Not significant
West of Coed Quinnet SINC	Local	None	N/A	N/A	N/A	Not significant
North of Coed Quinnet SINC	Local	None	N/A	N/A	N/A	Not significant

Coed Quinnet SINC	Local	None	N/A	N/A	N/A	Not significant
Land south of Blackland Farm SINC	Local	None	N/A	N/A	N/A	Not significant
Land north of Whitton Rosser Farm SINC	Local	None	N/A	N/A	N/A	Not significant
Land north of Little Hamston Farm SINC	Local	None	N/A	N/A	N/A	Not significant
Land north of Coedy Cwm SINC	Local	None	N/A	N/A	N/A	Not significant
Coedy Graig SINC	Local	None	N/A	N/A	N/A	Not significant
Coed Sion Hywel SINC	Local	None	N/A	N/A	N/A	Not significant
Brook Wood SINC	Local	None	N/A	N/A	N/A	Not significant
Betty Lucas Wood SINC	Local	None	N/A	N/A	N/A	Not significant
Coedy cwm SINC	Local	None	N/A	N/A	N/A	Not significant
Land south of Ty'n-y-Coed SINC	Local	None	N/A	N/A	N/A	Not significant
Redland Wood SINC	Local	None	N/A	N/A	N/A	Not significant
Land along River Waycock SINC	Local	None	N/A	N/A	N/A	Not significant
Amelia Trust Woodland Pond SINC	Local	None	N/A	N/A	N/A	Not significant
Amelia Trust Dew Pond SINC	Local	None	N/A	N/A	N/A	Not significant
Coedy Lan SINC	Local	None	N/A	N/A	N/A	Not significant

Land south of Blackland Farm SINC	Local	None	N/A	N/A	N/A	Not significant
Land northwest of Whitton Rosser Farm SINC	Local	None	N/A	N/A	N/A	Not significant
Land north of Llanvithyn Farm SINC	Local	None	N/A	N/A	N/A	Not significant
Coed Arthur SINC	Local	None	N/A	N/A	N/A	Not significant
Northwest of Garnllwyd Farm SINC	Local	None	N/A	N/A	N/A	Not significant
Log Wood SINC	Local	None	N/A	N/A	N/A	Not significant
Gaer Wood SINC	Local	None	N/A	N/A	N/A	Not significant
Arable	Sub-Local	Small areas of habitat will be lost as a result of construction and implementation of the scheme	Long	Low	Low	Minor/ Not significant
Improved Grassland	Sub-Local	Small areas of habitat will be lost as a result of construction and implementation of the scheme	Long	Low	Low	Minor/ Not significant
Semi-improved Neutral Grassland	Local	Small areas of habitat will be lost as a result of construction and implementation	Long	Low	Low	Minor/ Not significant



		tion of the scheme				
Poor Semi-Improved Neutral Grassland	Sub-Local	Small areas of habitat will be lost as a result of construction and implementation of the scheme	Long	Low	Low	Minor/ Not significant
Marshy Grassland	Local	Small areas of habitat will be lost as a result of construction and implementation of the scheme	Long	Low	Low	Minor/ Not significant
Woodland	Local	Habitat will be retained throughout the scheme	Long	Negligible	Negligible	Not significant
Mature Trees and Tree Lines	Local	Habitat will be retained throughout the scheme	Long	Negligible	Negligible	Not significant
Hedgerows	County	Habitat will be retained throughout the scheme	Long	Negligible	Negligible	Not significant
Scrub	Sub-Local	Habitat will be retained throughout the scheme	Long	Negligible	Negligible	Not significant
Ponds	Local	Habitat will be retained throughout the scheme	Long	Negligible	Negligible	Not significant
Watercourses/ Rivers/ Streams	Local	Habitat will be retained throughout the scheme	Long	Negligible	Negligible	Not significant
Bats (foraging and commuting)	National/ Regional	Habitats and connectivity will be retained throughout the scheme	Long	Negligible	Negligible	Not significant

Birds	Local	Habitats and connectivity will be retained throughout the scheme	Long	Negligible	Negligible	Not significant
Dormice	County	Habitats and connectivity will be retained throughout the scheme	Long	Negligible	Negligible	Not significant
Reptile	Local	Habitat will be retained throughout the scheme	Long	Negligible	Negligible	Not significant
Otter	County	Habitats and connectivity will be retained throughout the scheme	Long	Negligible	Negligible	Not significant

**11.9 IMPLEMENTATION OF MITIGATION**

11.9.1 As detailed in Section 11.7 above, no specific mitigation measures are required to be implemented through the scheme.

**11.10 RESIDUAL IMPACTS**

11.10.1 No significant residual effects have been identified from the scheme. The only residual impacts that have been identified are minor/ not significant and result from the loss of areas of grassland habitat under the direct footprint of the solar panels.

**11.11 SUMMARY AND CONCLUSIONS**

11.11.1 This Ecology and Conservation ES Chapter has identified no significant effects from the scheme on any ecological features. The results of this assessment are summarised in the table below.

**Table 11.9: Results of Assessment**

Ecological Feature	Value/ Sensitivity of Feature	Description of Impact	Magnitude of Impact (Without Mitigation)	Mitigation Measures	Residual Effect (Significance of Effect with Mitigation Measures)
Severn Estuary Ramsar	International	None	N/A	N/A	Not significant

Nant Whitton Woodlands SSSI	National	None	N/A	N/A	Not significant
Ely Valley SSSI	National	None	N/A	N/A	Not significant
Pysgodlyn Mawr SSSI	National	None	N/A	N/A	Not significant
Fferm Walters SSSI	National	None	N/A	N/A	Not significant
Coedydd Y Barri/ Barry Woodlands SSSI	National	None	N/A	N/A	Not significant
Land along Nant Llancarfan SINC	Local	None	N/A	N/A	Not significant
West of Coed Quinnet SINC	Local	None	N/A	N/A	Not significant
North of Coed Quinnet SINC	Local	None	N/A	N/A	Not significant
Coed Quinnet SINC	Local	None	N/A	N/A	Not significant
Land south of Blackland Farm SINC	Local	None	N/A	N/A	Not significant
Land north of Whitton Rosser Farm SINC	Local	None	N/A	N/A	Not significant
Land north of Little Hamston Farm SINC	Local	None	N/A	N/A	Not significant
Land north of Coed y Cwm SINC	Local	None	N/A	N/A	Not significant
Coed y Graig SINC	Local	None	N/A	N/A	Not significant
Coed Sion Hywel SINC	Local	None	N/A	N/A	Not significant
Brook Wood SINC	Local	None	N/A	N/A	Not significant
Betty Lucas Wood SINC	Local	None	N/A	N/A	Not significant
Coed y cwm SINC	Local	None	N/A	N/A	Not significant

Land south of Ty'n-y-Coed SINC	Local	None	N/A	N/A	Not significant
Redland Wood SINC	Local	None	N/A	N/A	Not significant
Land along River Waycock SINC	Local	None	N/A	N/A	Not significant
Amelia Trust Woodland Pond SINC	Local	None	N/A	N/A	Not significant
Amelia Trust Dew Pond SINC	Local	None	N/A	N/A	Not significant
Coed y Lan SINC	Local	None	N/A	N/A	Not significant
Land south of Blackland Farm SINC	Local	None	N/A	N/A	Not significant
Land northwest of Whitton Rosser Farm SINC	Local	None	N/A	N/A	Not significant
Land north of Llanvithyn Farm SINC	Local	None	N/A	N/A	Not significant
Coed Arthur SINC	Local	None	N/A	N/A	Not significant
Northwest of Garnllwyd Farm SINC	Local	None	N/A	N/A	Not significant
Log Wood SINC	Local	None	N/A	N/A	Not significant
Gaer Wood SINC	Local	None	N/A	N/A	Not significant
Arable	Sub-Local	Small areas of habitat will be lost as a result of construction and implementation of the scheme	Low	N/A	Not significant
Improved Grassland	Sub-Local	Small areas of habitat will be lost as a result of construction and implementation	Low	Species rich native meadow to be created in panel areas	Not significant

		n of the scheme		and buffer zones	
Semi-improved Neutral Grassland	Local	Small areas of habitat will be lost as a result of construction and implementation of the scheme	Low	Species rich native meadow to be created in panel areas and buffer zones	Minor/ Not significant
Poor Semi-Improved Neutral Grassland	Sub-Local	Small areas of habitat will be lost as a result of construction and implementation of the scheme	Low	Species rich native meadow to be created in panel areas and buffer zones	Not significant
Marshy Grassland	Local	Small areas of habitat will be lost as a result of construction and implementation of the scheme	Low	Species rich native meadow to be created in panel areas and buffer zones, wet areas will be largely retained	Not significant
Woodland	Local	Habitat will be retained throughout the scheme	Negligible	N/A	Not significant
Mature Trees and Tree Lines	Local	Habitat will be retained throughout the scheme	Negligible	N/A	Not significant
Hedgerows	County	Habitat will be retained throughout the scheme	Negligible	N/A	Not significant
Scrub	Sub-Local	Habitat will be retained	Negligible	N/A	Not significant

		throughout the scheme			
Ponds	Local	Habitat will be retained throughout the scheme	Negligible	N/A	Not significant
Watercourses/ Rivers/ Streams	Local	Habitat will be retained throughout the scheme	Negligible	N/A	Not significant
Bats (foraging and commuting)	National/ Regional	Habitats and connectivity will be retained throughout the scheme	Negligible	N/A	Not significant
Birds	Local	Habitat will be retained throughout the scheme	Negligible	N/A	Not significant
Dormice	County	Habitats and connectivity will be retained throughout the scheme	Negligible	N/A	Not significant
Reptile	Local	Habitat will be retained throughout the scheme	Negligible	N/A	Not significant
Otter	County	Habitats and connectivity will be retained throughout the scheme	Negligible	N/A	Not significant



## **12. TRAFFIC AND TRANSPORT**

## 12.1 INTRODUCTION

- 12.1.1 This chapter has been prepared by Sanderson Associates (Consulting Engineers) Limited and provides details of the transportation impact of the proposed development and assesses the likely effects of the traffic generated as a result of the development of the Oaklands Solar Farm and Battery Energy Storage System (BESS), south of Bonvilston, Vale of Glamorgan on the local and nearby strategic road network (SRN).
- 12.1.2 A Transport Statement (reference 300372-001-02) has been prepared in support of the development proposals, a copy of which is attached at **Appendix 12.1**. Information is provided in this chapter which satisfies the following criteria:
- Demonstrates to Vale of Glamorgan Council (VGC) that the proposals are in accordance with current national and local transport policies.
  - Demonstrates that the resultant traffic flows can be accommodated on the local and strategic road network.
  - Demonstrates that the proposed access arrangements will not be detrimental to traffic flow or highway safety, particularly those of vulnerable road users.
- 12.1.3 In addition to the Transport Statement, a separate Construction Traffic Method Statement (CTMS) (reference 300372-002-02) has been prepared which sets out the current and proposed access arrangements to the development site, the anticipated construction programme, construction vehicle numbers and routing of deliveries, construction worker numbers and the proposed construction hours. A copy of the CTMS is attached at **Appendix 12.2**.
- 12.1.4 This Chapter describes the assessment methodology and the baseline conditions relevant to the assessment. A summary of the likely effects and any mitigation measures considered necessary to avoid, prevent, reduce or, if possible, offset any likely significant adverse effects are discussed. The likely residual effects and any required monitoring after these measures have been employed are also considered. Opportunities for enhancement, where such opportunities exist, are also discussed.
- 12.1.5 This chapter (and its associated figures and appendices) is intended to be read as part of the wider ES, with particular reference to Chapter 8: Noise and Vibration and Section 14: Air Quality.

## 12.2 CONTEXT

### Planning Policy Context

- 12.2.1 Chapter 4 of the ES provides detailed information in relation to the development in a Planning Policy context. However, there are a number of specific, transportation related, policies at both a national and local level which are worthy of mention in this chapter.

### National Policy Wales

- 12.2.2 National Policy for Wales is contained in the document Planning Policy Wales (PPW) (Edition 11, February 2021). (Ref 12.1) Future Wales - The National Plan 2040 (Ref 12.2) sets out the framework for planning the change and development of Wales up to 2040.
- 12.2.3 National planning policy on highway and transport matters is provided throughout PPW



as well as in Technical Advice Note (TAN) 18: Transport (2007) (Ref 12.3). TAN 18 provides guidance to Local Authorities about integrating land use and transport planning and explains how transport impacts should be assessed and mitigated. It provides advice on:-

- Integration between land use planning and transport
- Location of development
- Parking
- Design of development
- Walking and cycling
- Public transport
- Planning for transport infrastructure
- Assessing impacts and managing implementation

### Local Planning Policy

12.2.4 The Council's current planning policy is the Vale of Glamorgan Local Development Plan 2011-2026, which was adopted in June 2017. (Ref 12.4). The Local Development Plan "provides a framework for sustainable development within the Vale of Glamorgan up to 2026" and is to "guide the growth of the Vale of Glamorgan over a fifteen year period and identifies the infrastructure needs of our communities in terms of employment, facilities and services needed to support that growth".

12.2.5 With regards transportation, the salient information relevant to the proposed development is as follows:

Point 6 of Policy MD2 – 'Design of New Development' states that development proposals should "*Have no unacceptable impact on highway safety nor cause or exacerbate existing traffic congestion to an unacceptable degree*".

12.2.6 The site is largely located in 'Local Search Area for Solar Energy MG30 (3) Land West of Five Mile Lane' as shown on the Proposals map. Policy MG30 'Local Search Areas for Solar Energy' states that "*In these areas proposals for solar energy generation schemes up to 50MW will be permitted provided there are no unacceptable effects on amenity, heritage assets or the environment*".

### Assessment Methodology

12.2.7 The following guidance has been taken into account in this assessment:

- LA 104 Environmental assessment and monitoring (Revision 1 August 2020) - Design Manual for Roads and Bridges (DMRB) (Ref 12.5)
- Institute of Environment (1993) Guidance Notes No. 1 'Guidelines for the Environmental Assessment of Road Traffic' Horncastle: IEA (Ref 12.6);

12.2.8 The primary methodology used in this assessment accords to that set out in the IEA guidance document indicated above, which is hereafter referred to in this chapter as the IEMA guidelines, and which remains an example of "good practice" for undertaking EIA and in the preparation of ES Transport Chapters. This focuses on the potential impacts on local roads and the users of those roads; and the potential impacts on land

uses and environmental resources fronting those roads, including the relevant occupiers and users

12.2.9 This recommends the screening criteria detailed below and it is considered appropriate to have due regard to these thresholds.

- 1) Roads where traffic flow would increase by more than 30% as a consequence of a proposed development (or the number of heavy goods vehicles will increase by more than 30%); or
- 2) Roads where traffic flows would increase by 10% and pass close to or through sensitive areas.

12.2.10 From the IEMA guidelines, it should be noted that projected change in traffic of less than 10% are generally considered to create no discernible environmental impact, given that daily variations in background traffic flow may fluctuate by this amount under normal operating conditions.

12.2.11 This chapter of the ES has drawn on details from the Transport Statement and CTMS prepared in support of the planning application. The Transport Statement and CTMS both contain a much more detailed operational analysis of the travel characteristics associated with the proposed development. The Transport Statement and CTMS have been produced in accordance with the parameters set out in the EIA Scoping Direction issued by the Planning Inspectorate on 28 July 2021; the Vale of Glamorgan Council's "Highway Observation Sheet" of 15 July 2021 and having due regard to local and national policy and guidance.

### Magnitude of Impact

12.2.12 The following items have been used to define the significance of the impacts identified:

- Substantial: where the proposed development could be expected to have a very significant impact (either positive or negative) on identified access routes to and from the site, existing sustainable modes of travel and the wider highway area of study.
- High: where the proposed development could be expected to have a major impact (either positive or negative) on identified access routes to and from the site, existing sustainable modes of travel and the wider highway area of study.
- Moderate: where the proposed development could be expected to have a noticeable impact (either positive or negative) on identified access routes to and from the site, existing sustainable modes of travel and the wider highway area of study;
- Minor: where the proposed development could be expected to result in a small, barely noticeable impact (either positive or negative) on identified access routes to and from the site, existing sustainable modes of travel and the wider highway area of study; and
- Negligible: where no discernible impact is expected as a result of the proposed development on identified access routes to and from the site, existing sustainable modes of travel and wider highway area of study.

### Receptors and Receptor Sensitivity

12.2.13 The IEMA guidelines (Ref 12.6) identify groups, locations and areas which may be sensitive to changes in traffic conditions and which should be considered for assessment. These potentially affected parties or receptors are summarised in **Table 12.1** below.

**Table 12.1: Extract from IEMA Guidelines**

Sensitive Groups, Locations & Areas		
People at home	People in work places	Open space
Pedestrians	Cyclists	Recreational sites
Children	Elderly	Hospitals
Disabled	Churches	Schools
Sites of visitor/tourist attraction		Historical Buildings

12.2.14 Where traffic flows are predicted to increase by 10% or more, those relevant sensitive groups, locations and areas, as summarised in **Table 12.1** above will be assessed. The IEMA guidelines also state that other groups, locations and areas could be added if the assessor considers it appropriate, as an example such areas may be where there is or predicted to be a sizable pedestrian activity but with poor physical features for pedestrian movement.

### 12.3 BASELINE CONDITIONS

#### Existing Site Operations

12.3.1 The site and surrounding areas are rural in nature, characterised by open countryside, farmland, rough scrubland, and waterbodies. Therefore, apart from routine agricultural vehicles visiting the site no vehicular activity of note takes place.

#### Existing Highway Network and Associated Traffic Flows

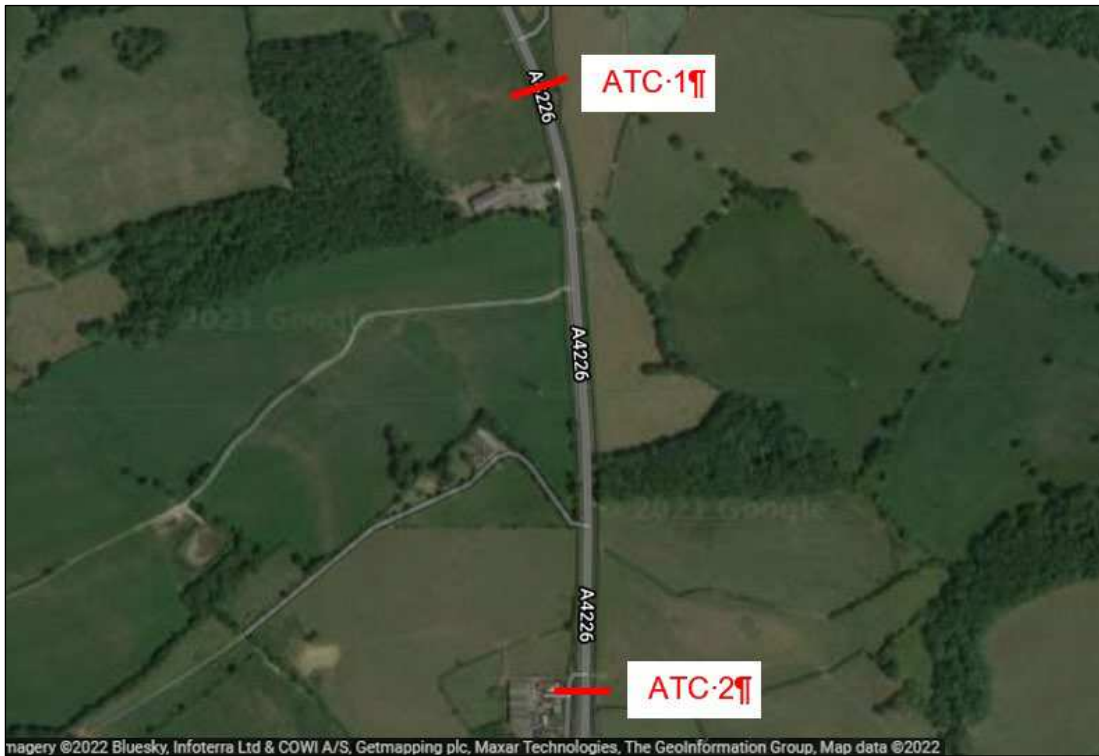
12.3.2 The vehicle access route to the site will most likely be via the M4 motorway at Junction 33. From here, the A4232 runs southeast to the western extent of Cardiff and joins the A48 at a roundabout junction. The A48 runs west in the direction of Bonvilston, however, prior to reaching the village, the A4226 can be joined at a signalised junction.

12.3.3 The proposed Development Areas are situated to the eastern and western sides of the A4226. The A4226 is classed as an Urban Clearway for a distance of 4 miles from the signal-controlled junction with the A48 some 800m to the north of the development site. It is subject to the national speed limit (60mph) and has a carriageway width of approximately 7.3m. There is a shared cycle/footway, with a typical width of 3.0 metres, running along the western side of the A4226 which is segregated from the carriageway by a 1.5m wide grass verge. Street lighting is present for an extent of around 140m from the signal-controlled junction with the A48.

#### Existing Traffic Flows

12.3.4 In order to understand the existing traffic volume and speed on the A4226, two Automatic Traffic Counts (ATCs) were undertaken for a 7-day period from the 6th-12th September 2021. The ATCs were positioned in the approximate locations shown in **Figure 12.1** below.

Figure 12.1: Location of ATC Equipment



12.3.5 The recorded 85th percentile speeds and volumes are shown in **Table 12.2**, with the recorded vehicle composition split into light and heavy vehicles being provided in **Table 12.3**, both set out below. The full ATC dataset is included at Appendix B of the Transport Statement (**Appendix 12.1**, Doc Ref. 4.01.12a).

Table 12.2: ATC Data – Volumes and Speed

	Direction of Travel	Number of Vehicles			85th percentile speed (mph)
		Total	5 day average	7-day average	
ATC	North	36137	5429	5162	57.9
	South	35834	5410	5119	60.7
ATC	North	36522	5511	5217	59.9
	South	35702	5387	5100	63.9

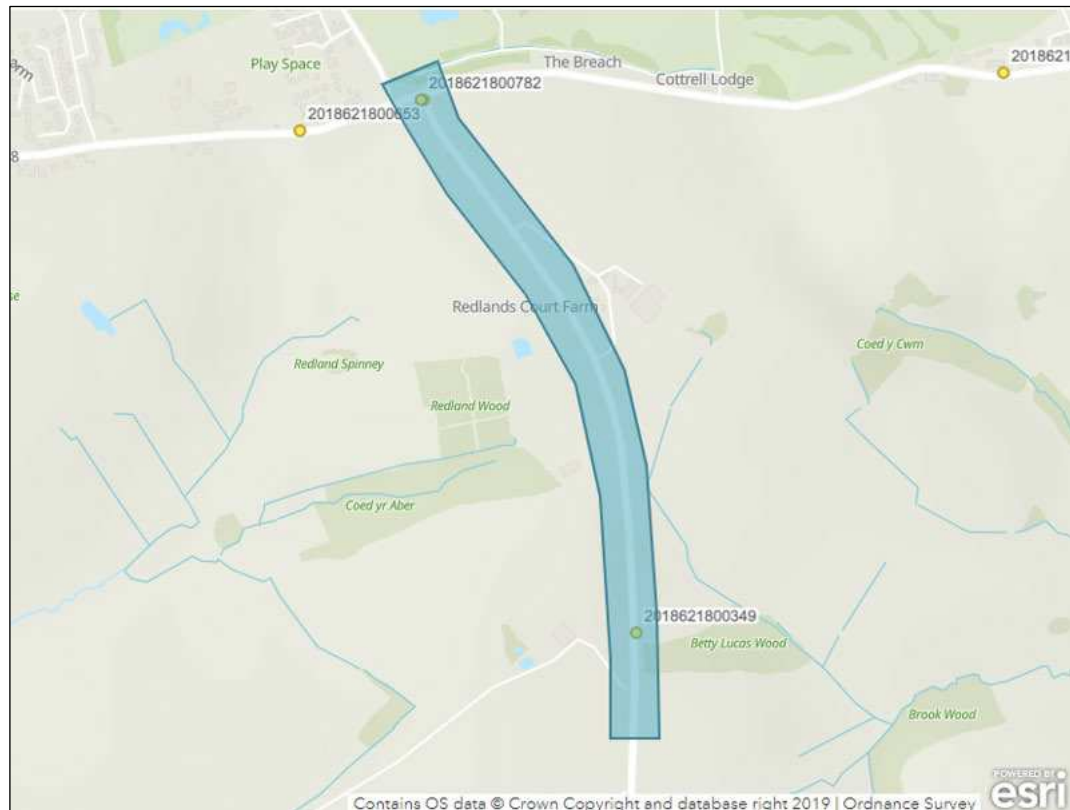
Table 12.3: ATC Data – Vehicle Composition

	Direction of Travel	Number of Vehicles			HGV%
		Total	Light	Heavy	
ATC	North	36137	35428	709	2.0
	South	35834	35270	564	1.6
ATC	North	36522	35903	619	1.7
	South	35702	35119	583	1.6

### Personal Injury Accident Data

- 12.3.7 The Crashmap accident database has been reviewed to identify any existing accident issues on the local highway network that may be adversely affected, or prolonged, as a result of the development proposals.
- 12.3.8 Crashmap.co.uk has been used to obtain information on personal injury collisions on the local highway network in the vicinity of the application site, which would be used by development traffic, over the 5-year period to December 2020. **Figure 12.2**, below, shows the extent of the search and results.

**Figure 12.2: Crashmap Accident Data Plot (5 years up to 31<sup>st</sup> December 2020)**



- 12.3.9 One incident has been recorded in the vicinity of the site frontages on the 9 April 2018 at 17:01. The road surface was wet with rain falling when two cars collided head-on. It is not clear why this might have occurred as the road has a straight alignment in this area and there is no suggestion of an overtaking/passing manoeuvre being undertaken.
- 12.3.10 Two incidents have been recorded at the junction of the A4226 and the A48.
- One incident occurred on the 10 January 2017 at 12:30 in fine and dry conditions. A goods vehicle turning left from the A4226 collided with another goods vehicle proceeding along the A48 from east to west.
  - One incident occurred on the 30 April 2018 at 12:48 in fine and dry conditions. It is not entirely clear what happened however two cars were involved, one of which was turning left from the A4226 and the other proceeding along the A48 from east to west. The latter is reported to have collided with a lamp post.
- 12.3.11 As the junction of the A4226 and the A48 is signalised, and has been since 2013, it is

considered that the incidents recorded in this location are likely due to driver error.

12.3.12 Full details of the incidents detailed above are available in Appendix D of the Transport Statement (**Appendix 12.1**, Doc Ref. 4.01.12a))

## 12.4 PROPOSED DEVELOPMENT

### Development Overview

12.4.1 The proposed installation and operation of a solar farm and BESS on land to the south of Bonvilston will comprise of the following:

- Photovoltaic (PV) panels;
- Battery Energy Storage System;
- Mounting frames;
- Scheme of landscaping and biodiversity enhancement;
- Inverters, transformers, substations (DNO and customer) and associated cabling (below ground);
- Stock fencing;
- Infra-red CCTV (cameras would operate using motion sensors and would be positioned inward only to ensure privacy to neighbouring land and property);
- Temporary set down areas and Internal service roads; and
- Site access for the construction and operational phases.

12.4.2 The site is split across three Development Areas (DAs), two (Pancross and Oaklands) are located to the west of the A4226 and one (Redlands) is to the east.

12.4.3 The panels will be arranged in rows in an east-west alignment across the DAs and orientated south for maximum efficiency. All panels will be mounted on frames and have a maximum height of 3m above ground level with the lowest part of the panel standing approximately 1m above ground level. The scheme will be operational for 40 years after which all equipment is anticipated to be removed from site with the exception of the underground cabling and the site returned to its previous use.

12.4.4 The site will be secured by a 2m high stock fence or similar with wire and wooden posts, or an alternative to suit visual setting and ecological requirements.

### Hours of Operation

12.4.5 It is proposed that during the construction phase of the development, when there is likely to be the most impact on the surrounding highway network, the site would have the following hours of operation:

Monday to Friday	08:00 to 18:00
Saturdays	08:00 to 16:00

12.4.6 Deliveries will be carried out within the hours above. Under exceptional circumstances, both working and deliveries outside of these hours may be required. In these cases, prior permission will be sought from Vale of Glamorgan Council.

### Staffing Levels

12.4.7 At a maximum, up to an estimated 80 staff will be on site during the construction period,

depending on the phases of the construction schedule. It is envisaged that staff will be from both local and regional contractors who will use shared transport such as crew cab transit vans.

12.4.8 The proposed hours of operation are detailed below:

Monday to Friday 08:00 to 18:00 (10 hours per day)  
Saturday 08:00 to 16:00 (8 hours)

#### Vehicle Routing

12.4.9 The supporting Construction Traffic Method Statement (Appendix 12B) contains a detailed assessment of each of the routes vehicles are likely to take to access the site.

12.4.10 Vehicles making deliveries will gain access from either:

- the east - via the M4 motorway at Junction 33. From here, the A4232 runs southeast to the western extent of Cardiff and joins the A48 at a roundabout junction.
- the west - via the A48 which connects to Bridgend and the M4 motorway

12.4.11 The A48 provides access to the A4226 at a signalised junction. The different areas of the site can be accessed via existing field gates on the A4226 approximately 1km south of the junction.

12.4.12 The A4226 is a single carriageway road that connects the A48 to the north with Barry to the south. The carriageway has a width of approximately 7.0m and a combined cycle/footway is present on the western flank. A 60mph speed limit is in place and street lighting is not provided for the majority of its length.

12.4.13 The A4226 joins the A48 at a signalised staggered crossroads junction. Toucan crossings are present on the A4226, A48 west and northern (unnamed road) arms. The A48 is a major single carriageway that runs east-west between Cardiff and Bridgend.

12.4.14 The A48 and the sections of the routes beyond are considered to be major regional and national roads whereby traffic flows already contain a significant proportion of large goods vehicles.

## 12.5 ASSESSMENT OF EFFECTS

### Vehicle Movements – Construction Period

12.5.1 This chapter presents traffic and transport considerations in order to assess any impact from the proposed development.

12.5.2 The construction of the solar farm and Battery Energy Storage System is expected to last around 6 months and this is expected to be the time when the highest level of trip generation will occur at the site. Following construction it is expected that the only vehicle movements will be concerned with maintenance of the site.

12.5.3 Initial movements in months 1 and 2 would result from deliveries of plant and equipment and materials required to secure the site and to form the construction compounds and set down areas. There would also be deliveries of items such as panels, battery units, transformers, control room and the solar panel support frame in months 1 to 4 as well as cabling, equipment/infrastructure in months 2 and 3.

12.5.4 Approximately 280 deliveries (560 movements) to the site would be required to deliver the panels and 90 deliveries (180 movements) of the frames and associated infrastructure will be needed. Additional HGV movements will also be generated through the import of fencing, cabling, crushed stone for access tracks, plant, transformers and control cabins.

12.5.5 **Table 12.4**, below and overleaf, provides a breakdown of the total expected deliveries to the site during the indicative construction programme. Expected HGV volumes and timings are based on best estimates at this stage and will be dependent on a number of factors, such as shipping schedules and the appointed contractor.

**Table 12.4: Indicative Vehicle Deliveries during Construction Phase – Total**

Construction Activity (indicative delivery vehicle)	Month						Total
	1	2	3	4	5	6	
Delivery of plant, equipment and materials (both 16.5m artic and 10m rigid)	60	60	40	30	15	15	220
Erection of security fencing and construction compound (10m rigid)	45	10					55
Cabling on site (16.5m artic)		13	7				20
Delivery of transformer & control equipment (10m rigid)			15	15			30
Delivery of frames & support posts (16.5m artic)	50	40					90
Delivery of PV panels (16.5m artic)	70	70	70	70			280
Removal of plant and equipment (both 16.5m artic and 10m rigid)						45	45
<b>Total</b>	<b>225</b>	<b>193</b>	<b>132</b>	<b>115</b>	<b>15</b>	<b>60</b>	<b>740</b>

12.5.6 It is anticipated that the construction phase will generate approximately 740 deliveries to site, or 1,480 individual movements (in and out). The first month will see the highest deliveries to site at 225.

12.5.7 The trip generation set out above will be split between the two set down areas as shown in **Tables 12.5** and **12.6** below.

**Table 12.5: Indicative Vehicle Deliveries – Pancross / Oaklands**

Construction Activity (indicative delivery vehicle)	Month						Total
	1	2	3	4	5	6	
Delivery of plant, equipment and materials (both 16.5m artic and 10m rigid)	40	40	30	20	10	10	150
Erection of security fencing and construction compound (10m rigid)	30	10					40
Cabling on site (16.5m artic)		10	5				15
Delivery of transformer & control equipment (10m rigid)			10	10			20
Delivery of frames & support posts	35	25					60



(16.5m artic)							
Delivery of PV panels (16.5m artic)	40	40	40	40			160
Removal of plant and equipment (both 16.5m artic and 10m rigid)						30	30
<b>Total</b>	<b>145</b>	<b>125</b>	<b>85</b>	<b>70</b>	<b>10</b>	<b>40</b>	<b>475</b>

**Table 12.6: Indicative Vehicle Deliveries – Redlands**

Construction Activity (indicative delivery vehicle)	Month						Total
	1	2	3	4	5	6	
Delivery of plant, equipment and materials (both 16.5m artic and 10m rigid)	20	20	10	10	5	5	70
Erection of security fencing and construction compound (10m rigid)	15						15
Cabling on site (16.5m artic)		3	2				5
Delivery of transformer & control equipment (10m rigid)			5	5			10
Delivery of frames & support posts (16.5m artic)	15	15					30
Delivery of PV panels (16.5m artic)	30	30	30	30			120
Removal of plant and equipment (both 16.5m artic and 10m rigid)						15	15
<b>Total</b>	<b>80</b>	<b>68</b>	<b>47</b>	<b>45</b>	<b>5</b>	<b>20</b>	<b>265</b>

12.5.8 Notwithstanding this, based on the proposed days of operation and the hours of work each day, a breakdown of expected HGV movements on a typical day is provided below. This has been based on the expected trip generation for Month 1, which is expected to be the period with the most intense period of deliveries. Based on a 6-day working week during the construction phase (Monday-Saturday), there could be up to 25 working days per month. In order to consider each working day similarly, the calculations to follow consider a 9 hour working day (Monday to Friday 10 hours and Saturday 8 hours).

- 225 deliveries, 450 two-way movements in month 1
- 25 working days in a month (Monday-Saturday) = 18 two-way movements per day approximately
- 9-hour day each working day = 1 movement every 60 minutes approximately.

12.5.9 Given that Month 1 is the most intense period for deliveries, it is expected that across the remaining 5 months the number of deliveries will be fewer.

12.5.10 In addition to the expected number of HGVs, there will be staff working on the site, who will most likely arrive before the operating hours of the site (before 08:00) and depart after the site closes each day (after 18:00). As set out previously, there is expected to be up to 80 staff on site (~26 per DA) at the peak of construction. Staff will arrive and depart the DAs in transit vans with a 'crew cab' with an expected minimum

capacity of 6 persons.

12.5.11 Given the above, there could be up to 14 vehicles arriving to the DAs in a morning and 14 vehicles departing the DAs in an evening. However, ~4 of these would access Redlands and ~10 would access Pancross/Oaklands. Parking areas are provided to accommodate the suggested number of vehicles accessing the plots.

12.5.12 Given the above, it is estimated that in the hour preceding the opening of the site each day there would be approximately 14 transit vans arriving at the site. There would be corresponding departure trips from site in the hour following the closure of site each day. Given the highly trafficked nature of the A4226 and A48, the contribution to existing traffic flows from the proposal will be **negligible**.

12.5.13 It is recognised that the construction phase of the development will increase the total number of vehicles on the local highway network and in particular the number of HGVs.

12.5.14 However, the levels of both light and HGV movements will not exceed the triggers set out in Paragraph 12.2.13 and correspondingly none of the receptors set out in **Table 12.1** will be affected by the development.

#### Future Years Assessment – Operational Period

12.5.15 Once operational, the solar farm will be unmanned and managed by remote access. Access will be required for occasional maintenance and inspections which will be typically made by light goods vehicles, e.g. vans or 4x4 vehicles but not expected to be larger than a 7.5t vehicle. It is expected that these visits to the sites for maintenance will be sporadic and will amount to no more than one every other day on average.

12.5.16 Once on site there will be sufficient space for manoeuvring to allow the visiting vehicle to leave in a forward gear. This is a non-material increase in traffic and is not, therefore, considered to be an intensification of use of the local highway network.

12.5.17 There will be no public access into the site.

12.5.18 Permanent 4m wide internal access roads will be maintained throughout the life of the solar farm.

#### Future Years Assessment – Decommissioning Period

12.5.19 After 40 years of operational life the solar farm will be decommissioned and returned to its former agricultural use. It is anticipated that a similar amount of time and type of vehicle will be required to decommission the facility as that to construct it.

12.5.20 It is envisaged that the de-commissioning period would generate similar traffic levels to those set out in this chapter in relation to the construction period. However, as that period is some 40 years ahead it is difficult to predict how the vehicle movements would compare with background traffic levels in that future year scenario and what the impact will be.

12.5.21 However, it is expected that the future de-commissioning will be the subject of further review at that time and, therefore, likely that additional information will be submitted which will include any appropriate mitigation measures considered necessary.

#### Junction Capacity Assessment

12.5.22 As set out in Paragraph 12.5.8 the peak vehicle activity during the construction period

(month 1) is predicted to give rise to an average of approximately one HGV movement per hour throughout the 6-day working week.

12.5.23 When considering the additional vehicle movements that would be generated with the day-to-day staff arrivals and departures it is noted that these are likely to occur outside of typical network peak hours and as such are unlikely to result in a significant impact upon the highway and any potential sensitive receptors along the highway corridor.

12.5.24 As such it is not considered that detailed junction capacity assessments are required for either the site access points or any off-site junctions.

## 12.6 PROPOSED MITIGATION

12.6.1 Notwithstanding the above, it is considered that an appropriate highway safety signage strategy should be prepared which will mitigate the risks associated with the HGV movements on the surrounding highway network.

12.6.2 With this in mind, a detailed Highway Safety Signage Strategy will be provided as part of a future detailed CTMS. This will include a Temporary Signage Strategy which will be implemented along the routes to the Development Areas, warning other road users of the presence of construction vehicles. This will be agreed in consultation with the Local Planning and Highway Authority. Swept path analysis of the access routes into the Development Areas has been submitted as part of both the Transport Statement (**Appendix 12.1**, Doc Ref. 4.01.12a) and the CTMS (**Appendix 12.2**, Doc Ref. 4.01.12b)).

## 12.7 SUMMARY OF PREDICTED EFFECTS

12.7.1 It is acknowledged that this development would rely upon HGV's during its construction and subsequent decommissioning periods. Both these periods will be relatively short, but it could potentially be perceived that the traffic arising as a result of the development could impact upon the adjacent highway network and surrounding areas and as such it is considered necessary to identify sensitive receptors along the access routes to the development site.

12.7.2 From the IEMA Guidelines (see **Table 12.1**) several classes of receptor could be affected by the development traffic including pedestrians, cyclists and people at home. Drawing 300372-001, attached at Appendix 12C, sets out the locations of such receptors.

12.7.3 However, when viewing the predicted development traffic, which will be at its peak during the construction period (see **Table 12.4** and Paragraph 12.5.8) against background levels (see **Table 12.3**) it is clear that the level of traffic associated with the development site at its peak activity during the construction and decommissioning periods is modest when compared to the existing traffic flows on the adjacent network. Therefore, any impact would be minor.

12.7.4 During the development site's operational period traffic levels will be **negligible** as much of the maintenance and control of the solar equipment is to be undertaken remotely and as such the effect of that traffic upon the adjacent highway network and surrounding areas would be **negligible**.

## 12.8 IMPLEMENTATION OF MITIGATION

12.8.1 Although mitigation from a transport perspective is not considered necessary in this instance for the reasons provided earlier in this chapter, it is considered appropriate

for a detailed Highway Safety Signage Strategy to be provided as part of a future detailed CTMS. This will include a Temporary Signage Strategy which will be implemented along the routes to the Development Areas, warning other road users of the presence of construction vehicles.

## 12.9 RESIDUAL IMPACTS

12.9.1 From a transport perspective is not considered that there will be any residual impacts arising from the proposed development during its construction, operational or decommissioning periods.

## 12.10 SUMMARY AND CONCLUSIONS

12.10.1 To summarise, it has been demonstrated by the evidence submitted within the accompanying Transport Statement and Construction Traffic Method Statement that the proposed solar farm and Battery Energy Storage System development at Oaklands, south of Bonvilston, Vale of Glamorgan, would not have a discernible impact upon the adjacent highway network and surrounding area.

12.10.2 Any sensitive receptors potentially affected by the development and its associated traffic would be so at a minor / negligible level.

12.10.3 Therefore, it is concluded that there are no highway, traffic or transportation reasons why the proposed development at Oaklands should not proceed.



## 13. CLIMATE CHANGE

## 13.1 INTRODUCTION

13.1.1 This Chapter has been prepared by Sirius Planning in order to satisfy the requirements of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, an assessment has been undertaken on the effects of the Development with regard to climate change. Schedule 4 advises on the information which should be included in Environmental Statements. This includes:

*“a description of the likely significant effects of the development on the environment resulting from....the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.”*

## 13.2 ASSESSMENT APPROACH

### Grid Connection

13.2.1 The IEMA Guide to Climate Change Resilience and Adaptation (June 2020) provides an updated framework for the effective consideration of climate change resilience and adaptation in the EIA process in line with the Town and Country Planning (EIA) Regulations (Wales) (2017).

13.2.2 The document was originally published in 2015, in line with the 2014 amendments to the EU EIA Directive and was updated in 2020.

13.2.3 The methodology in the IEMA guide is set out below and has been incorporated within this section. EIA Reports produced in line with this guidance are to be proportionate in their approach and not include superfluous assessment that does not address likely material issues.

### EMA Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance<sup>18</sup>

13.2.4 IEMA published this guidance (referred to hereafter to as IEMA GHG Guidance) to assist practitioners with addressing greenhouse gas (GHG) emissions assessment and mitigation in statutory and non – statutory EIA. The guidance indicates that a ‘good practice’ approach is advocated where GHG emissions are always considered and reported but at varying degrees of detail depending on the project.

13.2.5 The guidance notes that there are a variety of different assessment methods available for measuring and quantifying the GHG emissions associated with the built environment, ranging from general guidance to form standards for the use of an EIA. The Guidance recognising that *‘qualitative assessments are acceptable, for example: where data is unavailable or where mitigation measures are agreed early on in the design phase with design and engineering teams’*.

### Assessment Methodology – General Approach

13.2.6 ‘Climate’ is generally understood to mean the weather conditions prevailing over a long period of time and climate change refers to changes in recorded long term climate trends. There is no set way of incorporating climate matters into an ES, although there is some guidance which IEMA have prepared which sets out the two main approaches that can be taken to determine a project’s climate change impact. These involve

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<sup>18</sup> IEMA. Assessing greenhouse gas emissions and evaluating their significance. [online]. <https://www.iema.net/preview-document/assessing-greenhouse-gas-emissions-and-evaluating-their-significance>

identifying:

- The vulnerability of the Development to climate change (climate change adaptation / resilience); and
- The direct and indirect influence on the Development on climate change (climate change mitigation).

13.2.7 The vulnerability of the Development to climate change considers effects on the Development as a receptor (this is referred to in IEMA Guidance as Climate Change Resilience and Adaptation). A high-level climate change risk and resilience assessment has been undertaken to identify the potential risks of climate change on the Development and to high design measures to increase its resilience and adaptation to climate hazards, such as extreme hot and cold weather, intense rainfall, high winds and storm events.

13.2.8 In lieu of a prescribed methodology, IEMA guidance on Climate Change Resilience and Adaptation (2020) has been prepared to assist practitioners with the effective consideration “*of both climate change resilience and adaptation in the EIA process*”. The guidance stresses that climate change should be an integrated consideration within the EIA, by undertaking an assessment that is “*proportional to the evidence base available to support any assessment*” and focusses on impacts “*specific to project*”.

#### Scope of Assessment

13.2.9 It was noted within the Scoping Direction issued by The Planning Inspectorate (now PEDW) on the 28<sup>th</sup> July 2021 that “*the Inspectorate is content, provided an appropriate level of assessment is included, that it is left to the applicant to decide whether to include a standalone chapter or to address this issue as necessary in each separate chapter. The SR refers to offsetting some 868,000 tonnes of CO<sub>2</sub> over the project’s lifespan; the applicant is reminded that positive significant effects should also be reflected in the ES. The es should also address whether the project is vulnerable to climate change in a proportionate fashion in the appropriate chapter.*”

13.2.10 Owing to the nature of the Development as a proposed solar farm and BESS providing and storing renewable electricity, an assessment of carbon emissions throughout the construction and operational phases has not been undertaken. During the construction phase, any emissions associated with construction traffic is expected to be minor and temporary in nature. During the operational phase, no emissions are expected.

13.2.11 The assessment has assumed a lifespan of the Development of 40 years, with the Development being fully operational from 2024.

#### Assessing Resilience to Climate Change

13.2.12 To ensure climate change adaptation is assessed, this section draws on recognised climate change projections, existing guidance and emerging good practice as well as relevant information presented in the ES and documents which form part of the planning application, to ensure that appropriate project mitigation and risk management is included in the Development design. In particular, this chapter draws upon the findings of Chapter 10 Hydrology and Chapter 11 Ecology and Conservation.

13.2.13 Chapter 10 assesses the vulnerability of the Development to all possible types of flooding. The accompanying FCA identifies and assesses the risks of all forms of

flooding to and from the Development and demonstrates how these flood risks will be managed, taking climate change into account. The FCA identifies opportunities to reduce the probability and consequences of flooding.

13.2.14 Chapter 11 (Ecology) provides a detailed assessment of potential ecological impacts associated with the Development and evaluates the importance of the habitats and species present on the Site. Climate Change and biodiversity (in particular, the loss of biodiversity) are intrinsically linked, with the effects brought about by rapid climate change through shifting weather patterns and extreme weather events resulting in changing habitats for species. Therefore, this chapter draws upon the Ecology and Conservation chapter which is based on a wide array of surveys as described in Chapter 11, to assess the resilience of the site to climate change.

#### Identifying Climate Change Projections

13.2.15 The current climate change projections, 'UKCP18', first released in November 2018 and updated in September 2019 and July 2021. These are the most up to date climate change projections available. The Met Office states that UKCP18 provides a valid assessment of the UK's future climate over land, but that when considering decisions that are sensitive to projected future changes in summer rainfall, additional information should also be used. In line with IEMA Guidance, this Chapter utilises climate projections using the 'worst case scenario' of future weather projections, and therefore Representative Concentration Pathway (RCP) 8.5 scenarios are used. This worst-case scenario assumes a 'business-as-usual' pathway through a combination of assumptions about high population levels, relatively slow income growth with modest rates of technological change and energy intensity improvements, leading in the long term to high energy demand and GHG emissions in absence of climate change policies<sup>19</sup>.

13.2.16 Taking into account the nature and location of the Development, the following climate related parameters are also considered to have the potential to impact upon the operation of the Development:

- Wind (speed, direction and gustiness);
- Temperature; and
- Precipitation.

#### Assessment of Likely Significant Effects

13.2.17 The resilience of the Development to climate change impacts is qualitatively assessed.

13.2.18 A high value receptor that has very little resilience to changes in climatic conditions should be considered more likely to be significantly affected than a high value receptor which is more resilient to changes in climatic conditions. If there is uncertainty about how a receptor will adapt to a changing climate, then a precautionary approach should be employed (IEMA, 2015). Therefore, receptors have been assumed to have a high sensitivity to the changing climate.

#### Limitations and Assumptions

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<sup>19</sup> Riahi, K., Rao, S., Krey, V. *et al.* RCP 8.5—A scenario of comparatively high greenhouse gas emissions. *Climatic Change* **109**, 33 (2011). <https://doi.org/10.1007/s10584-011-0149-y>



13.2.19 The following assumptions and limitations that apply to this assessment have been set out in this section.

13.2.20 The UKCP18 climate change projections are not climate change predictions as they include a degree of uncertainty. As stated in the UKCP18 Science Overview Report<sup>20</sup>.

*“While the global and regional projections of future climate use the latest climate models and are diverse they cannot cover all potential future climate outcomes out to 2100 (or beyond in the case of sea level) ...”*

13.2.21 The 21st century projections presented in this report are produced for the Representative Concentration Pathways (RCP)<sup>21</sup> climate change scenarios. The results are therefore subject to any inherent limitations of the assumed emissions scenarios including:

*“The probabilities represent the relative strength of evidence supporting different plausible outcomes for UK climate, based on the climate models, physical insight, observational evidence and statistical methodology used to produce them. However, they may not capture all possible future outcomes, because, for example, some potential influences on future climate are not yet understood well enough to be included in climate models.”*

13.2.22 The following receptors identified in other ES topic chapters and other supporting documents, are considered potentially sensitive to climate change:

- **Chapter 10: Hydrology:** As changing climate and weather patterns can influence rainfall and alter the risk of flooding.
- **Chapter 11 Ecology and Conservation:** As changing climate and weather patterns can influence the prevalence and health of species.

### 13.3 BASELINE CONDITIONS

13.3.1 This section summarises current climate conditions for the local area based on historic weather data and information about extreme weather events. The information presented below presents average weather conditions along with exceptional weather occurrences. To maintain relevance to current weather trends the displayed information has been calculated using data collected over the past two decades.

13.3.2 The climate profile is taken from closest available data source to the Site, located at ‘St-Athan (Vale of Glamorgan)’, approximately 6.5km to the south west<sup>22</sup>.

13.3.3 Regionally, the climate is warm and temperate with high levels of rainfall even in the driest month. The driest month is May whilst the wettest month is December.

13.3.4 In a year, the average rainfall is 86.93 mm a month, compared to a UK average of 116.89 mm a month. The driest month is May (an average of 87.11mm). Most of the precipitation here falls in December, averaging 175.80 mm in a month.

13.3.5 The average annual temperature is 9.43 °C and the rainfall is around 1464.65mm per year. The warmest month of the year is July with an average temperature of 19.34 °C. The lowest average temperature occurs in January where it is around 4.38 °C.

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<sup>20</sup> Met Office (Nov 2018, updated March 2019) UKCP18 Science Overview Report. Available at:

<https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Overview-report.pdf>

<sup>21</sup> Established by the Intergovernmental Panel on Climate Change (IPCC).

<sup>22</sup> Met Office: Climate Station. Available online at: <https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/u10hb54gm>

### Hydrology

- 13.3.6 The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal). The majority of the site is located within Zone A with very small proportion of the site, to the west and east which is located within Zone B. However, it has been concluded that the site has not historically flooded.
- 13.3.7 The Flood Map for Planning (FMfP) shows that the site is located within Flood Zone 1 for rivers and sea flooding. The majority of the site is located within Flood Zone 1 for surface water and/or small watercourses however, a small proportion of the site is located within Flood Zone 3 with more than a 1 in 100 (1%) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change. This is associated with small watercourses and it should be noted that the proposed built development will be located within Flood Zone 1. The floodwater is shown to be retained within the channel of the watercourses.
- 13.3.8 The proposed development is classified as 'less vulnerable'. Less vulnerable uses are appropriate within DAM Zones A and B. There are no constraints relating to flooding from rivers or the sea, other than to avoid increasing risk elsewhere. The justification test is not applicable.
- 13.3.9 There will be no net loss in flood storage capacity or impact on movement of floodwater across the site. The overall direction of the movement of water will be maintained within the developed site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed.
- 13.3.10 In conclusion, the flood risk to the site can be considered to be limited; the site is situated in DAM Zones A and B with a very low annual probability of flooding and from all sources.
- 13.3.11 There should be no perceivable changes to the upstream or downstream hydrology and to flood risk as a result of the proposals. In terms of surface water runoff, the proposals will not increase the impermeable area on the site, as the size of the inverter house and PV modules are considered to be negligible in the context of the site areas.
- 13.3.12 Research into the impact of solar farm panels on runoff rates and volumes indicates that solar panels do not have a significant impact on runoff volumes, peak rates or time to peak rates when the ground below the panels is vegetated. Therefore, with well-maintained grass underneath the panels, the solar panels themselves will not have a significant impact on the runoff volumes, peaks or time to peak.
- 13.3.13 A number of mitigation measures are recommended in Chapter 10.

### Ecology

- 13.3.14 No part of the site is covered by any statutory designations for nature conservation. Six statutory designated sites lie within the Site's potential Zone of Influence (Zoi). All of these are categorised as being of national importance aside from the Severn Estuary Ramsar and SPA which lies 9.8km from the site. None are considered likely to be affected by the scheme due to their significant distance from the site and the nature of the proposed works being unlikely to generate effects over these distances. The closest statutory designated site is the Nant Whitton Woodlands Site of Special Scientific Interest (SSSI) which lies approximately 200m from the site boundary. Works

are not anticipated to affect this woodland either directly or indirectly and the magnitude of effect is therefore not applicable.

13.3.15 There are twenty-six non-statutory designations within the Site's potential Zol. All of these are considered to be of local importance. Notably, the site sits on the North of Coed Quinnet SINC, Coed Quinnet SINC, Betty Lucas Wood SINC, Coed y cwm SINC, Land south of Ty'n-y-Coed SINC, Redland Wood SINC and Brook Wood SINC. Whilst these SINC sites are located immediately adjacent to the site development boundary of the scheme, they are all designated for the presence of woodland and semi-improved grassland habitats which will not be affected by the installation of the solar panels or the BESS either directly or indirectly. The magnitude of effect on these non-statutory designated sites is therefore not applicable.

13.3.16 Habitats across the site include arable fields sown with a perennial ryegrass, improved grassland, semi-improved neutral grassland, poor semi-improved neutral grassland and marshy grassland. Hedgerows run through and around the site. There are areas of scrub, six ponds, and watercourses adjacent to the boundaries. The scheme retains all existing trees and hedges.

13.3.17 A number of recommendations and mitigation measures are suggested, the details of which can be found in Chapter 11.

## 13.4 FUTURE CLIMATE CONDITIONS (UP TO 2070)

### Temperatures

13.4.1 The central estimate of increase in mean annual temperature is 2.1°C; it is very unlikely to be less than 0.8°C and is very unlikely to be more than 3.6°C. The central estimate of increase in winter mean temperature is 2.0°C; it is very unlikely to be less than 0.3°C and very unlikely to be more than 3.8°C. The central estimate of increases in summer mean temperature is 2.5°C; it is very unlikely to be less than 0.5°C and very unlikely to be more than 4.8°C.

### Precipitation

13.4.2 Winter rainfall is projected to increase and summer rainfall is most likely to decrease. The central estimate of change in winter mean precipitation is 13%; it is very unlikely to be less than -9% and is very unlikely to be more than 38%. The central estimate of change in summer mean precipitation is -25%; it is very unlikely to be less than -55% and is very unlikely to be more than 3%.

13.4.3 With respect to the continued validity of UKCP18 projections for summer rainfall (see above), whilst the full range of summer rainfall outcomes from UKCP18 are considered to remain valid in informing planning decisions, rainfall patterns across the UK are not consistent and will vary dependent on seasonal and regional scales and will continue to vary in the future (Met Office, 2019)<sup>23</sup>.

### Wind Speed and Storms

13.4.4 Winds associated with major storm events can be damaging and disruptive events with implications for property, power networks, road and rail transport and aviation. Calm

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<sup>23</sup> Met Office (2019): UKCP18 National Climate Projections: An Overview. Available]: [https://www.ice.org.uk/getattachment/eventarchive/flooding-conference-2019-cardiff/Carol-McSweeney-\(no-notes\).pdf.aspx](https://www.ice.org.uk/getattachment/eventarchive/flooding-conference-2019-cardiff/Carol-McSweeney-(no-notes).pdf.aspx)

periods with little wind, particularly over prolonged periods, can affect air quality whilst winds from a particular direction can be a critical factor in the spread of pathogens. Both of these cases are also examples where the combination of factors such as wind, temperature and precipitation can exacerbate their impacts (e.g. air quality issues tend to be worse under conditions of light winds and higher temperatures; pathogen spread can require wind, temperature and precipitation conditions to be favourable) (Met Office, 2019<sup>24</sup>).

- 13.4.5 Changes in wind speeds are not currently available at the regional level and there remains considerable uncertainty in the projections, with respect to wind speed. Near surface wind speeds are expected to increase in the second half of the 21st century with winter months experiencing more significant impacts of winds (Met Office, 2019). This is accompanied by an increase in frequency of winter storms over the UK. However, the increase in wind speeds is projected to be modest.

#### Summary

- 13.4.6 In the UK, we expect to see warmer and wetter winters, hotter and drier summers and more frequent and intense weather extremes. Climate change will make these conditions more likely. More rainfall is expected to happen in winter storms. While the temperatures may be milder, winters will tend to be wetter, with more potential for flooding.

### 13.5 CLIMATE CHANGE ADAPATION AND RESILIENCE

- 13.5.1 This section provides an assessment of the main potential risks presented by a changing climate to the Development. It outlines the relevant disciplines of climate change adaptation to the four key trends identified: the projected increase in mean summer and winter temperatures; projected increase in annual precipitation; projected decrease in mean summer precipitation; and extreme weather events (such as heavy and/or prolonged precipitation and storm events).

#### Temperature

- 13.5.2 If temperatures do increase as predicted, then this may impact on habitat which may affect the behaviour of animals such as birds. It could also affect the growth rates and composition of plant communities, invertebrates and habitats.

#### Wind

- 13.5.3 Over the lifetime of the Development, UKCP18 shows the change in wind speeds and storms is limited to well within the limits of current inter-annual variability. Therefore, no effects are anticipated. Given the maximum heights of the Development and the projected modest increase in central wind speeds, it is anticipated that there will be no likely effect as a result of increased wind speeds during the operational phase of the Development. Despite this, wind uplift calculations will be carried out at the detailed design change.

#### Biodiversity

- 13.5.4 As outlined, the site supports a range of habitats and species, with statutorily

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<sup>24</sup> Met Office (2019): UKCP18 Factsheet: Wind. Available online:  
<https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-wind.pdf>

designated and non-statutorily designated sites proximate to the Site. Changes in precipitation and temperature could potentially affect the future of bird assemblages, particularly when taking changes in habitat into consideration.

- 13.5.5 Biodiversity net gain will be delivered as part of the Development and will include habitat retention, creation, enhancement and likely succession of habitats.
- 13.5.6 Through ensuring that the planting is suited to adapt to the climatic changes outlined and through increasing the biodiversity of the Site, it is considered that the Development will be increasingly resilient to the effects of climate change. Although the effects of climate change are uncertain, the enhancement in biodiversity will result in a positive significant effect.

#### Precipitation and Flood Risk

- 13.5.7 The risk from increased precipitation is the potential for flooding, particularly if it is associated with extreme events. For the Development, this increases the risk for potential destruction/disruption of infrastructure. The effects of flooding are discussed later. UKCP18 show that over the winter season precipitation is projected to increase.
- 13.5.8 The FCA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.
- 13.5.9 The solar arrays and vulnerable infrastructure including the BESS will be located above the ground level. The modules will be raised off the ground, such that the leading edge of each panel will be approximately 0.75m above the ground, and the top edge approximately 3.2m off the ground. The frame supporting the solar panels should not impede overland flows or reduce flood storage capacity as only the legs of the panels will be below ground. The legs are pushed into the ground and will not be ballasted through use of concrete bases. The BESS containers will sit on concrete plinths.
- 13.5.10 Substations and transformers and will limit ground disturbance and disruption. The Development will maintain existing drainage, with only minimal areas of impermeable surfacing proposed.
- 13.5.11 Climate change is projected to increase the likelihood of flooding from most flood sources and therefore an assessment of the effects has been considered over the estimated development lifetime.
- 13.5.12 Construction of the proposed development has the potential to impact upon flood risk and surface water quality. However, the effects are likely to be localised, temporary and controlled by embedded mitigation measures and further mitigation measures, such that the residual effects would have a negligible effect and no significant residual effect.
- 13.5.13 Similarly, the potential effects arising during the operational of the proposed development would be controlled by embedded mitigation measures and further mitigation measures, such that the residual effects would have a negligible effect and no significant residual effect.
- 13.5.14 The findings of the Flood Consequences Assessment (which accounted for Climate Change) demonstrated that the development would not result in any significant residual adverse impacts on drainage or flood risk.

## 13.6 CONCLUSION

- 13.6.1 A Climate Resilience assessment has been undertaken with respect to the Development, drawing on best practice guidance. The assessment has included a thorough review of the different facets of climate resilience and the existing baseline conditions of the Site. The assessment has concluded that the Development has embedded mitigation measures which will result in the Development being resilient to changes in temperature, extreme weather events (including flooding), changes in wind and shifting habitats. No additional mitigation measures are proposed with respect to Climate Resilience.
- 13.6.2 Overall, a significantly positive impact is identified through the generation of renewable energy as part of overall measures to tackle climate change.



## **14. OTHER SCOPED IN ENVIRONMENTAL CONSIDERATIONS**

## 14.1 INTRODUCTION

14.1.1 This chapter considers those remaining topics that were confirmed as being 'scoped in' the Environmental Impact Assessment by the Scoping Direction provided by the Planning Inspectorate in July 2021 (**Appendix 1.2**, Doc Ref. 4.01.2). However, they do not require a stand-alone ES chapter, but rather a proportionate section to address the matters. The topics considered in this chapter include:

- Major Accidents and / or Disasters;
- Public Health and Wellbeing; and
- Air Quality (in relation to the construction and decommissioning phases).

## 14.2 MAJOR ACCIDENTS AND / OR DISASTERS

14.2.1 The Scoping Direction (**Appendix 1.2**, Doc Ref. 4.01.2) states the following regarding Major Accidents and / or Disasters:

*“...The Inspectorate notes that there is a potential fire risk associated with certain types of batteries such as lithium-ion and that safety measures are required in the design to minimise the risk of fire. The Inspectorate considers this to be part of the EIA process in line with Schedule 4 of the EIA Regulations (Wales) 2017...The ES should ensure that risks of accidents are accounted for and mitigated in line with Schedule 4. A proportionate section on this aspect should be included in the ES...”*

14.2.2 The begin nature of the proposed development is such that it is unlikely to release pollutants or any hazardous, toxic or noxious substances to air or land and is unlikely to have a significant effect in terms of pollution and nuisance.

14.2.3 A search was conducted using COMAH 2015 Public Information Search<sup>25</sup> from the Health and Safety Executive (HSE). No results were found within 4.8km of the application site.

14.2.4 A High-Pressure gas pipeline was identified running north to south within the western part of Development Area 2. Following discussions with Wales and West Utilities, it was confirmed that there was a 12m wide easement in place, centred on the pipeline. Therefore, the deployment of solar panels was removed from the field in which the pipeline runs. Given the access to Development Area 2 is off the A4226, vehicle crossing over the pipeline cannot be avoided. As per the United Kingdom Onshore Pipeline Operator's Association (UKOPA), specific measures and risk assessments will be agreed with Wales and West Utilities prior to commencement of the proposed works to protect the pipeline.

### Potential for the Development to Cause Major Accidents / Disasters

14.2.5 The development is not considered likely to cause a significant accident or disaster risk during either the construction or operational phases.

### Construction Phase

14.2.6 Health and Safety during the construction phase is addressed in Section 14.3 below which concludes that the risk to both construction workers and the general public is low. A detailed Construction Environmental Management Plan (CEMP) will be

<sup>25</sup> <https://notifications.hse.gov.uk/COMAH2015/Search.aspx>



implemented during the construction period and will include the requirement for all construction activities to be undertaken in accordance with statutory requirements and best practice methods.

#### Operational Phase

- 14.2.7 When operational, the proposed development will comprise fixed photovoltaic (PV) panels and a battery energy storage compound, together with associated electrical infrastructure including inverters, transformers, substations and cabling. All development on the site will be subject to routine maintenance such that it is not considered to pose a significant risk of creating an accident or disaster.
- 14.2.8 All development areas will be secured by a 2m stock fence or similar with CCTV ensuring there is no public access and ensuring public safety. In addition, the battery energy storage compound will be secured by a 4m acoustic fence, with the DNO substation within the compound also secured by a 2.4m palisade fence.
- 14.2.9 Risk associated with fire from the associated electrical equipment are also considered low as the proposed electrical systems will have cooling mechanisms and will automatically shut down should any overheating occur.

#### *Battery Energy Storage Fire Risk*

- 14.2.10 There have been significant and material safety improvements in the battery storage technologies including different battery chemistry make-up and individual fire suppressant systems.
- 14.2.11 As a multimillion-pound investment it is essential that insurance and protection is in place for the development. Inherently any form of built development e.g., residential, commercial or industrial buildings can be at risk from catching fire. This risk also exists for battery energy storage facilities but advancements in technology and protocols have resulted in the adoption of an integrated three stage fire prevention and suppression system built into the design to ensure this risk is managed out. A typical system comprises:
1. Early warning of any battery cells failing with gas detectors (in each enclosure) – this triggers automatic power disconnection and an alarm to the remote monitoring station;
  2. Automatic inert gas discharge is triggered if heat is detected, together with an automatic disconnect of the battery and an alarm signal to the remote monitoring station. This inert gas displaces all oxygen in the battery area and stops any fire developing; and
  3. Internal water mist deluge system activation (requiring low water volumes) that can be supported by fire services. Primarily to address heat build-up, and alleviating / preventing potential damage to adjacent enclosures.
- 14.2.12 To provide an additional layer of protection, batteries for energy storage systems are also generally housed in separate containers. This reduces the risk of a problem in one container spreading to the rest of the facility.
- 14.2.13 Further general safety measures, including prevention and mitigation measures on fire safety associated with the BESS is presented in a Battery Fire Safety Statement in

**Appendix 14.1** (Doc Ref. 4.01.14).

**Vulnerability of the Development from Major Accidents / Disasters**

- 14.2.14 Consideration has been given to the vulnerability of the proposed development to major accidents / disasters, particularly in terms of the potential from flooding. A Flood Consequence Assessment (FCA) has been prepared as part of the hydrological assessment presented in Chapter 10 of this ES. The FCA (a copy of which is included in **Appendix 10.1**, Doc Ref. 4.01.10) confirms that the application site is located within Flood Zone A with a very small portion of the site, to the west and east located within Zone B with very low annual probability of flooding.
- 14.2.15 The FCA also considers the potential contribution to flood risk from the proposal. Whilst the panels themselves will be impermeable surfaces, surface water will run off the panels and onto the permeable ground beneath. Therefore, surface water runoff from the site will be largely the same as existing levels.
- 14.2.16 In addition, the facility can be controlled remotely so that the transmission of electricity could be quickly disabled if any concerns should arise resulting from major accidents / disasters.

**Conclusion**

- 14.2.17 It is considered that the potential for major accidents and disasters from the proposed development will not be significant and has therefore not been considered any further.

**14.3 PUBLIC HEALTH AND WELLBEING**

- 14.3.1 The Scoping Direction (**Appendix 1.2**, Doc Ref. 4.01.2) states the following regarding Public Health and Wellbeing:

*“...It is acknowledged that effects in this respect are unlikely to be significant...the 2017 EIA Regulations require that an EIA consider effects on population and human health. The ES should therefore address this issue in a proportionate manner”.*

- 14.3.2 The proposed development is unlikely to release pollutants or any hazardous, toxic or noxious substances to air or land. Potential health impacts are therefore related primarily to construction and operational related impacts.

**Health Impacts During the Construction Phase**

- 14.3.3 Comprehensive health and safety assessments are an essential part of the construction process and would be carried out prior to construction by the contractor in accordance with relevant legislation. The appointed Site Manager will have the responsibility of Health and Safety on site during the construction phase and all personnel working on site will be required to follow the appropriate operational procedures, which will include the need to wear the appropriate Personal Protective Equipment (PPE).
- 14.3.4 The potential impacts from noise and vibration during the construction and operational phases has been assessed and the results are presented in Chapter 8 of this ES. The assessment concludes that the proposal will not result in significant environmental effects to identified receptors.
- 14.3.5 A Transport Statement incorporating an outline Construction Traffic Method Statement

(CTMS) have been prepared and are presented in **Appendix 12.1** (Doc Ref. 4.01.12a). This sets out the anticipated traffic generation associated with the proposed development. Given the short duration of the construction phase and the relatively low background traffic numbers, it is expected that proposed vehicle movements will not lead to significantly adverse effects on health from vehicle emissions. All deliveries will take place within temporary construction set down areas and away from the public highway, therefore no adverse impacts on road safety are anticipated. Once operational, visits to site will be limited to largely monthly visits by car or van.

- 14.3.6 Dust can be created from the movement of construction traffic and from general construction activities and particles can be carried by prevailing wind. Construction traffic carrying loose materials will be covered to reduce dust generation. Weather and ground conditions will be observed on a daily basis throughout the construction phase. In addition, plant and equipment will be maintained in accordance with manufacturer's specifications to help control air emissions. Vehicle and construction equipment shall be switched off when not in use (where practicable) to avoid unnecessary emissions. Consideration of potential effects on air quality is presented in section 14.4 of this ES.
- 14.3.7 A detailed CEMP will be implemented during the construction period and will include the requirement for all construction activities to be undertaken in accordance with statutory requirements and best practice methods.

#### Health Impacts During the Operational Phase

- 14.3.8 Once operational, there will be no public access to the facility, which will be secured by fencing and monitored by CCTV.
- 14.3.9 The generation and transmission of electricity produced by the proposed development can be safely managed. The panels themselves are inert, static structures, there will be no issues relating to the release of light, heat energy or electromagnetic radiation likely. The power generated by each array would be transmitted through insulated cables buried below the ground. The battery units and associated electrical equipment would be housed in sealed containers mounted above the ground.
- 14.3.10 In addition, the scheme can be controlled remotely so that the transmission of electricity could be quickly disabled if any immediate health and safety concerns should arise.

#### Conclusion

- 14.3.11 It is considered that the potential for adverse impacts on public health and wellbeing from the proposed development will not be significant and therefore public health and wellbeing has not been considered further.

### 14.4 AIR QUALITY

- 14.4.1 Solar developments have no direct source of emissions to the atmosphere during the operational phase. Possible impacts to the local air quality only have the potential to occur during the short period of the construction and decommissioning phase through vehicular and plant emissions and through the creation of dust.
- 14.4.2 The Scoping Direction (**Appendix 1.2**, Doc Ref. 4.01.2) states the following regarding Air Quality:

*“...Whilst it is agreed that a standalone chapter is not required, Air Quality in relation to the construction and decommissioning phase (dust, construction traffic emissions) should be considered in relevant chapters of the ES...”*

- 14.4.3 The site is not within or near an Air Quality Management Area and proposed traffic generation during the limited duration of the construction period will not lead to significant vehicle emissions. Excessive dust is unlikely to be generated through anchoring of the frames to the ground as the majority of the frames will be secured by piles that will be pushed into the ground. Excavation is limited to scraping of top and sub soil for proposed tracks, BESS compound and foundations for the inverters, transformers and substation bases and trenching thus minimising the potential for ground disturbance and the liberation of dust emissions. Vehicle movements on site will be limited to transportation of equipment to/ and across site.
- 14.4.4 An outline Construction Environmental Management Plan (OCEMP) is presented in **Appendix 6.3** (Doc Ref. 4.01.6). A detailed CEMP will be implemented during the construction period. The mitigation measures outlined below are proposed to ensure that adequate mitigation procedures are in place for dust mitigation during the construction phase:
- Wheel washing equipment will be available and used on-site, as required, to prevent the transfer of dirt and debris onto the public highway;
  - Dust generating activities will be minimised during dry, windy conditions where possible;
  - Where required, loads into and out of the site will be sheeted;
  - Soil stockpiles will be covered when left for extended periods;
  - Where necessary a dust suppression / water spray system will be available; and
  - Implementation a dust monitoring scheme as required.
- 14.4.5 Given the limited duration of the proposed construction works and the nature of works during the construction phase, the potential for dust creation will be relatively low.
- 14.4.6 The potential impacts during the decommissioning phase are expected to be similar to those identified for the construction phase. Due to the long-life span of the project, no details of this can be provided at present, however it is recommended that a condition outlining the requirement for a Decommissioning Method Statement is attached to any planning decision.

### Conclusion

- 14.4.7 It is considered that potential effects on air quality will not be significant. A detailed CEMP will be implemented during the construction phase and will require all construction activities to be undertaken in accordance with best practice methods.

## 15. CUMULATIVE

## 15.1 INTRODUCTION

- 15.1.1 Chapters 7 to 14 of the Environmental Statement have considered the proposed development relative to the current baseline conditions, which exist at the site and the surrounding area. Where appropriate, mitigation measures have been proposed and the residual effects of the development have been assessed.
- 15.1.2 **Table 15.1** below presents a concise summary of the predicted residual environmental effects of the proposed development

Table 15.1: Summary of Predicted Environmental Effects

	Phase	Summary of Predicted Effect Prior to Mitigation	Summary of Predicted Effects Post Mitigation	Sensitivity
Landscape and Visual	Construction / Decommissioning	<p><u>Landscape Character</u> The short-term and reversible nature of these activities on landscape character will ensure that the overall effects will be, at worst, <b>minor adverse</b>. These will be limited to the local context of the site boundaries, short term and temporary effects.</p> <p><u>Visual Impact</u> The short-term and reversible nature of these activities on views and visual receptors will ensure that the overall effects will be, at worst, <b>minor adverse</b>. These will be experienced by a small number of receptors and form small features in the overall view.</p>	<p><u>Landscape Character</u> The short-term and reversible nature of these activities on landscape character will ensure that the overall effects will be, at worst, <b>minor adverse</b>. These will be limited to the local context of the site boundaries, short term and temporary effects.</p> <p><u>Visual Impact</u> The short-term and reversible nature of these activities on views and visual receptors will ensure that the overall effects will be, at worst, <b>minor adverse</b>. These will be experienced by a small number of receptors and form small features in the overall view.</p>	<b>Borough</b>
	Operational	<p><u>Landscape Character</u> In terms of landscape value, the site is of a <b>Medium</b> landscape value. Landscape mitigation has been incorporated into the design of the scheme and will be implemented from the outset of the proposal. Therefore, the conclusions of the post</p>	<p><u>Landscape Character</u> Susceptibility to change considered to be Medium. It is accepted that there would be some undue consequences of development, but the landscape has some capacity to accept change due to the development form and scale. It is considered that the landscape effects upon the setting of the Special Landscape Area, as a result of the</p>	<b>Borough</b>

		<p>mitigation effects should only apply.</p> <p><u>Visual Impact</u>                  Visual mitigation has been incorporated into the design of the scheme and will be implemented from the outset of the proposal. Therefore, the</p>	<p>development would be <b>Moderate at Year 1</b> reducing to <b>Minor at Year 10</b> (following successful establishment of mitigation hedgerows and tree planting) which are '<b>Not Significant</b>' Landscape effects</p> <p>As effects on historic features would be localised and likely to be of a lower level than that which could potentially occur and that the historic field systems outside of the site would not be adversely affected it is considered that the landscape effects upon the setting of Llancarfan HLA, as a result the development would be <b>Minor (in landscape terms)– a 'Not Significant'</b> Landscape effect.</p> <p>The significance of landscape effect of the solar DAs upon local area is determined by consideration of the landscape sensitivity and magnitude of landscape effect. A '<b>Moderate</b>' significance of landscape effect is concluded overall, this is a '<b>Not Significant</b>' effect.</p> <p><u>Visual Impact</u>                  The visual assessment established that no residential receptors would experience effects of a 'Significant' nature.</p>	
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		conclusions of the post mitigation effects should only apply.	Effects on PROW's are ' <b>Moderate-Major</b> ' at the greatest levels, but 'Not Significant' overall, at scheme opening from these PROW's. Of the 17 viewpoints considered, a single viewpoint was considered to experience visual effects of a 'significant' nature which was Viewpoint 5 from a locally elevated position along a PROW.  The remaining viewpoints, despite some locations offering visibility to the Development Areas which for some (mostly close-range locations) would experience up to <b>Moderate</b> and <b>Moderate-Major</b> level of effect, these were all considered to be of a ' <b>Not Significant</b> ' nature.	
Noise and Vibration	Construction / Decommissioning	<u>Noise</u> Delivery vehicles and construction / decommissioning activities over the 6-month construction period without mitigation considered to be temporary <b>negligible to minor adverse</b> .  <u>Vibration</u> <b>Negligible</b> impact.	<u>Noise</u> Construction and decommissioning works post mitigation are considered to be temporary <b>negligible to minor adverse</b> .  <u>Vibration</u> <b>Negligible</b> impact.	<b>Local</b>
	Operational	<u>Noise</u> Operational noise will be within acceptable standards. Acoustic fencing included in design of the	<u>Noise</u> – Operational noise will be within acceptable standards – impacts with imbedded mitigation into the design considered <b>negligible</b> .	<b>Local</b>

		<p>BESS compound – impacts considered <b>negligible</b>.</p> <p><u>Vibration</u> Impacts considered to be <b>negligible</b>. As such no mitigation is required</p>	<p><u>Vibration</u> Impacts considered to be <b>negligible</b>.</p>	
<b>Historic Environment</b>	Construction / Decommissioning	<p><u>Archaeology (Direct)</u> Proposed works would have <b>moderate adverse</b> effect on identified heritage assets.</p> <p><u>Heritage (Indirect)</u> The proposal will have a <b>moderate adverse</b> effect on identified historic assets.</p>	<p><u>Archaeology (Direct)</u> Proposed works would have <b>minor adverse</b> effect on identified heritage assets following proposed mitigation measures.</p> <p><u>Heritage (Indirect)</u> The proposal will have a <b>moderate adverse</b> effect on identified historic assets.</p>	<b>National</b>
	Operational	<p><u>Archaeology (Direct)</u> Proposed works would have <b>moderate adverse</b> effect on identified heritage assets.</p> <p><u>Heritage (Indirect)</u> The proposal will have a <b>moderate adverse</b> effect on identified historic assets.</p>	<p><u>Archaeology (Direct)</u> Proposed works would have <b>minor adverse</b> effect on identified heritage assets following proposed mitigation measures.</p> <p><u>Heritage (Indirect)</u> The proposal will have a <b>moderate adverse</b> effect on identified historic assets.</p>	<b>National</b>

Hydrology, Flood Consequences and Drainage	Construction / Decommissioning	<p><u>Surface Water Runoff / Flooding</u> Potential for increased drainage and flood damage – Impacts without mitigation considered <b>minor to moderate adverse</b></p> <p><u>Surface Water Quality</u> Increased erosion, sediment loading and risk of spills – Impacts without mitigation considered <b>moderate to major adverse</b></p>	<p><u>Surface Water Runoff / Flooding</u> The phase would not lead to irreversible compaction of soils on the site therefore not reducing infiltration – Impacts considered <b>negligible</b></p> <p><u>Surface Water Quality</u> Erosion and sediment control measures will be implemented prior to any grading or servicing works commencing – Impacts considered <b>negligible</b></p>	Local
	Operational	<p><u>Surface Water Runoff / Flooding</u> Flooding of Application Site generating physical hazards and contamination of floodwaters - Impacts without mitigation considered <b>minor adverse</b>.</p> <p><u>Surface Water Quality</u> Increased erosion, sediment loading and risk of spills - Impacts without mitigation</p>	<p><u>Surface Water Runoff / Flooding</u> Rain would fall off each PV panel to ground where it would infiltrate and the impermeable bases of the transformers and substations are negligible in comparison to the site area. It is not anticipated the proposal will create additional runoff from the site - Impacts considered <b>negligible</b></p> <p><u>Surface Water Quality</u> Long term erosion and sediment control measures will be monitored and maintained where necessary to ensure</p>	Local

		considered <b>minor to major adverse</b> .	minimal impacts to water quality - Impacts considered <b>negligible</b> .	
<b>Ecology</b>	Construction / Decommissioning	<p><u>Designated Sites</u> Effects are considered to be <b>neutral</b> or <b>negligible</b> on designated sites within the Zone of Influence (Zol).</p> <p><u>Habitats</u> Effects range from <b>negligible</b> on existing areas of woodland, scrub, hedgerow, trees, ponds and watercourses through to <b>minor adverse</b> on existing areas of arable land, improved grassland, semi-improved neutral grassland, poor semi-improved neutral grassland and marshy grassland.</p> <p><u>Species</u> Effects range from negligible on species is considered to be <b>negligible</b>.</p>	<p><u>Designated Sites</u> No specific mitigation is proposed. Effects are considered to be <b>neutral</b> or <b>negligible</b> on designated sites within the Zone of Influence (Zol).</p> <p><u>Habitats</u> Following mitigation, effects on existing areas of woodland, scrub, hedgerow, trees, ponds and watercourses, existing arable land, improved grassland, semi-improved neutral grassland, poor semi-improved neutral grassland and marshy grassland are considered to be <b>negligible</b>.</p> <p><u>Species</u> No specific mitigation is proposed. Effects range from negligible on species is considered to be <b>negligible</b>.</p>	<p><b>Local to International</b></p> <p><b>Local to International</b></p> <p><b>Local to International</b></p>
	Operational	<p><u>Designated Sites</u> Effects are considered to be <b>neutral</b> or <b>negligible</b> on</p>	<p><u>Designated Sites</u> Effects are considered to be <b>neutral</b> or <b>negligible</b> on designated sites within the Zone of Influence (Zol).</p>	<p><b>Local to International</b></p>

		<p>designated sites within the Zone of Influence (Zol).</p> <p><u>Habitats</u>                  Effects range from <b>negligible</b> on existing areas of woodland, scrub, hedgerow, trees, ponds and watercourses through to <b>minor adverse</b> on existing areas of arable land, improved grassland, semi-improved neutral grassland, poor semi-improved neutral grassland and marshy grassland.</p> <p><u>Species</u>                  Effects range from negligible on species is considered to be <b>negligible</b>.</p>	<p><u>Habitats</u>                  Effects range from <b>negligible</b> on existing areas of woodland, scrub, hedgerow, trees, ponds and watercourses through to <b>minor adverse</b> on existing areas of arable land, improved grassland, semi-improved neutral grassland, poor semi-improved neutral grassland and marshy grassland. A 173% net gain in habitats will be delivered and a 14.81% gain in hedgerows. This is considered a <b>significant beneficial</b> effect.</p> <p><u>Species</u>                  Effects range from negligible on species is considered to be <b>negligible</b>.</p>	<p><b>Local to International</b></p>
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<b>Traffic and Transport</b>	Construction / Decommissioning	The levels of both light and HGV movements are predicted to have a <b>negligible</b> effect on receptors. Contribution to existing traffic flows will be <b>negligible</b> .	Although mitigation from a transport perspective is not considered necessary in this instance, it is considered appropriate for a detailed Highway Safety Signage Strategy to be provided as part of a future detailed CTMS. This will include a Temporary Signage Strategy which will be implemented along the routes to the Development Areas, warning other road users of the presence of construction vehicles. Impacts will remain <b>negligible</b> following mitigation.	<b>Local</b>
	Operational	During the development site's operational period traffic levels will be <b>negligible</b> as much of the maintenance and control of the solar equipment is to be undertaken remotely and as such the effect of that traffic upon the adjacent highway network and surrounding areas would be <b>negligible</b> .	Impact to remain as <b>negligible</b> .	<b>Local</b>

<p><b>Climate Change</b></p>	<p>Construction / Decommissioning</p>	<p>The low intensity and short duration of the construction/decommissioning works will have a <b>negligible</b> impact as a contribution to climate change. Negligible effects are predicted.</p> <p>Potential to impact upon flood risk considered to be <b>negligible</b> due to the limited increase to impermeable areas.</p>	<p>The low intensity and short duration of the construction/decommissioning works will have a <b>negligible</b> impact as a contribution to climate change. <b>Negligible</b> effects are predicted as such no mitigation is required.</p>	<p><b>National</b></p>
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	Operational	<p>The proposal will have an export capacity of circa 50MW of electricity, enough to power nearly 20,400 homes per year and offset approximately 20,200 tonnes of CO2 every year, the equivalent of taking over 5,000 petrol / diesel cars off the road.</p> <p>The Battery Energy Storage System (BESS) will have a capacity to charge, store and export up to 50MVA of electricity to the local distribution network. The BESS will deliver significant environmental benefits, enabling technology for renewable generation, replacing the required for gas fired power generation and providing rapid response power to satisfy peak demand. In performing these roles, the development has the ability to reduce carbon dioxide emissions by over 20,600 metric tonnes annually whilst also providing electricity storage equivalent to supplying over 20,800 homes<sup>26</sup>.</p> <p>This is considered a <b>major beneficial</b> impact.</p> <p>Incorporated mitigation will ensure the proposal will be resilient to climate change effects (increased flood risk and</p>	<p>The proposal will have an export capacity of circa 50MW of electricity, enough to power nearly 20,400 homes per year and offset approximately 20,200 tonnes of CO2 every year, the equivalent of taking over 5,000 petrol / diesel cars off the road.</p> <p>The Battery Energy Storage System (BESS) will have a capacity to charge, store and export up to 50MVA of electricity to the local distribution network. The BESS will deliver significant environmental benefits, enabling technology for renewable generation, replacing the required for gas fired power generation and providing rapid response power to satisfy peak demand. In performing these roles, the development has the ability to reduce carbon dioxide emissions by over 20,600 metric tonnes annually whilst also providing electricity storage equivalent to supplying over 20,800 homes<sup>27</sup>.</p> <p>This is considered a <b>major beneficial</b> impact.</p> <p>Incorporated mitigation will ensure the proposal will be resilient to climate change effects (increased flood risk and extreme weather) over the life of the development. Impacts considered <b>negligible</b>.</p>	National
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		extreme weather) over the life of the development. Impacts considered <b>negligible</b> .		
<b>Major Accidents and / or Disasters</b>	Construction / Decommissioning	The development is not considered likely to cause a significant accident or disaster risk during the construction or decommissioning phases.  No significant change and a <b>negligible</b> impact is predicted.	Whilst the proposal is expected to result in no significant change and a <b>negligible</b> impact, a detailed Construction Environmental Management Plan (CEMP) will be implemented during the construction period and will include the requirement for all construction activities to be undertaken in accordance with statutory requirements and best practice methods.	<b>Local</b>
	Operational	The development is not considered likely to cause a significant accident or disaster risk during the operational phase.  It is considered that the potential for major accidents and disasters from the proposed development will not be significant and a <b>negligible</b> impact is predicted.	Whilst the proposal is expected to result in no significant change and a <b>negligible</b> impact, inherent safety features are built into the design. The application is accompanied by a Battery Fire Safety Statement.	<b>Local</b>
	Construction / Decommissioning	Without any mitigation, there would likely be a <b>minor adverse</b> impact on public health through	Comprehensive health and safety assessments are an essential part of the	<b>Local</b>

<sup>26</sup> Internal calculations using OFGEM Typical Domestic Consumption Values and BEIS Carbon Conversion Factors

<sup>27</sup> Internal calculations using OFGEM Typical Domestic Consumption Values and BEIS Carbon Conversion Factors

<b>Public Health and Wellbeing</b>		noise and vibration, dust creation and impacts on air quality.	<p>construction process and would be carried out prior to construction by the contractor in accordance with relevant legislation. The appointed Site Manager will have the responsibility of Health and Safety on site during the construction phase and all personnel working on site will be required to follow the appropriate operational procedures, which will include the need to wear the appropriate Personal Protective Equipment (PPE).</p> <p>A detailed CEMP will be implemented during the construction period and will include the requirement for all construction activities to be undertaken in accordance with statutory requirements and best practice methods.</p> <p>Following implementation of mitigation measures the residual impact is predicted to be <b>negligible</b>.</p>	
	Operational	Once operational, there will be no public access to the facility, which will be secured by fencing and monitored by CCTV. A <b>negligible</b> impact is predicted.	Once operational, there will be no public access to the facility, which will be secured by fencing and monitored by CCTV. A <b>negligible</b> impact is predicted.	<b>Local</b>
	Construction / Decommissioning	Possible impacts to the local air quality only have the potential to	A detailed CEMP will be implemented and predicted residual effects post	<b>Local</b>

<b>Air Quality</b>		<p>occur during the short period of the construction and decommissioning phase through vehicular and plant emissions and through the creation of dust.</p> <p>Given the limited duration of the proposed construction works and the nature of works during the construction phase, the potential for dust creation will be relatively low.</p> <p>Impacts are considered to be <b>minor adverse</b> prior to mitigation.</p>	mitigation are expected to be <b>negligible</b> .	
	Operational	<p>Solar developments have no direct source of emissions to the atmosphere during the operational phase.</p> <p>The impact is therefore considered to be <b>negligible</b>.</p>	Impacts to remain as <b>negligible</b> .	<b>Local</b>

## 15.2 CUMULATIVE IMPACTS

15.2.1 In isolation, a proposed development may be considered to have insignificant environmental impacts. However, these effects have the potential to be magnified when considered in conjunction with other existing or proposed developments. These are referred to as cumulative impacts and such impacts have the potential to occur in the following ways:

- Whether any of the individual environmental effects of the proposed development will combine to create a cumulative effect that is greater than the sum of the individual effects, this is known as combined impacts; and
- How effects from the proposed development could be combined with similar effects from other sites to result in significant cumulative effects.

15.2.2 **Table 15.1** provides a summary of the predicted residual environmental effects resulting from the proposed development. These effects have been identified by the EIA as those remaining following mitigation. It must be remembered that the baseline assumed as part of the EIA accounts for current land-uses in the vicinity of the application site.

15.2.3 Of the environmental topic areas considered as part of the EIA, the significance of impacts from the proposed operations considered to be greater than negligible are limited to:

- Landscape and Visual;
- Noise and Vibration;
- Historic Environment;
- Ecology; and
- Climate Change.

15.2.4 The potential impacts on landscape character and visual amenity were identified during the construction and decommissioning phase as minor (negative) due to the short duration. During the operational phase whilst adverse landscape effects are acknowledged, a moderate significance of landscape effect is concluded, this is not significant in EIA terms. In terms of visual amenity, up to and including major adverse significant impacts will be limited to one locally elevated position along a PROW and focussed to a particular location with the most open visibility.

15.2.5 With regards to Noise and Vibration impacts during the construction and decommissioning phases a minor adverse impact is expected. However, this is a temporary impact and measures to control noise will be implemented.

15.2.6 In terms of the Historic Environment, during the construction/decommissioning period a temporary moderate adverse impact is predicted on the Registered Historic Landscape of Llancarfan following the implementation of mitigation measures. During the operational period, following implementation of mitigation measures, a moderate adverse impact is predicted on the Registered Historic Landscape of Llancarfan and a minor adverse impact is predicted on Coed y Cwm Ringwork and Castle Ringwork.

15.2.7 In terms of ecology, during the construction/decommissioning and operational periods, following implementation of mitigation measures, no significant residual ecological

effects have been identified from the scheme. The only residual impacts that have been identified are minor adverse and result from the loss of areas of grassland habitat under the direct footprint of the solar panels. However, through proposed enhancements, a 173% net gain in habitats will be delivered and a 14.81% gain in hedgerows. This is considered a significant beneficial effect.

- 15.2.8 In terms of climate change, during the operational phase of the solar farm the potential impact will be significantly beneficial through the generation of renewable energy. The proposed development will be operational for 40 years, generating significant renewable energy benefits. Following this period the site will be restored back to agriculture

#### Assessing Cumulative Impact – Site Based

- 15.2.9 In terms of assessing the interactive impacts from the proposed development in isolation, it is considered that the following topics will have an adverse effect:

- Moderate impact to landscape character and up to major impacts for some nearby visual receptors during the operational phase;
- Minor impacts to nearby receptors on noise and vibration levels during the temporary 6-months construction period;
- Moderate impacts on the Registered Historic Landscape of Llancarfan during both the construction and operational phase and minor impacts on several Scheduled Monuments during the operational period; and
- Minor impacts to certain habitats and species during the 6-months construction / decommissioning phase.

- 15.2.10 It is considered there is no synergistic characteristics between temporary impacts to certain site-based habitats and species, landscape character/visual amenity, heritage assets and known archaeology during the construction and decommissioning phases.

- 15.2.11 During the operational phase potential impacts to nearby visual receptors and landscape character were assessed, as were potential impacts to historic landscape areas and heritage assets. It is considered that opportunities for synergistic effects to increase the impacts on identified receptors beyond that assessed individually are negligible given the different sensitivities of the identified receptors.

#### Assessing Cumulative Impact – Off Site

- 15.2.12 In terms of cumulative influences from beyond the application site boundary, it should be remembered that the baseline of the EIA included surrounding land-uses. Interrogation of the Planning Register and the list of DNS proposals allowed a review of applications received within the last three years.

- 15.2.13 A search for planning applications within 6km of the site was undertaken. The results of this search are summarised in **Table 15.2** below. There are two solar schemes within 1km of the site; one is now built (ref:2014/00798/FUL) and this is located c.450m south of the site, and the other (ref: 2021/00110/OBS) is located c.700m east of the site and is consented but not yet built. The former is a 6MW scheme and the latter is a 65MW scheme.

Table 15.2: Planning Applications within 6km

Solar Farm Planning Applications					
Application Ref.	Distance from Oaklands	Capacity	Site Area	Date completed	Lifespan
2014/00798/FUL (approved 21/11/2014)	450m south	6MW	17.7ha	12/05/2017	40 years (approved 18/08/2021 – 2020/00818/FUL)
2015/00852/FUL (approved 14/01/2016)	2.7km north east	3MW	8.25ha	June 2018	25 years
2014/00081/FUL (approved 01/08/2014)	3.3km south	7MW	17.9ha	Prior August 2016	25 years
2013/00617/FUL (approved 14/01/2014)	2.2km south	8MW	19.1ha	11/07/2014	30 years (approved 04/10/2016 – 2016/00979/FUL)
2015/00632/FUL (approved 04/09/2015)	3.2km south	5MW	11.5ha	30/03/2016	30 years (approved 12/10/2016 – 2016/01035/FUL)
2014/01490/FUL (approved 15/05/2015)	4.5km south west	5MW	12.8ha	Prior to August 2016	25 years
2013/00912/FUL / 14/2213400 (allowed on appeal 09/07/2014)	3.8km south west	4.36MW	10.8ha	Prior to August 2016	25 years
2012/01224/FUL (approved 08/02/2013)	2.5km west	7.5MW	16.5ha	15/03/2014	40 years (approved 05/10/2020 – 2020/00926/FUL)
2012/01285/FUL (approved 08/03/2013)	5.5km east	5MW	6.6ha	Prior to August 2016	25 years
2013/00895/FUL (approved 22/11/2013) Extension to the one above	5.5km east	5MW	4.05ha	Prior to August 2016	25 years
2021/00001/DNS (approved 22/06/2021) Extension to the two above	5.5km east	25MW	31.8ha	Not constructed	40 years
2021/00110/OBS Screening Request determined EIA	700m east	65MW (30MW battery)	96.5ha	Not constructed	40 years

(decision 03/03/2021)					
2022/00244/OBS Screening Request determined not EIA (decision 18/03/2022)	4.7km southwest	35MW	40ha	Not constructed	40 years
<b>Battery Planning Applications</b>					
<b>Application Ref.</b>	<b>Distance from Oaklands</b>	<b>Capacity</b>	<b>Site Area</b>	<b>Date completed</b>	<b>Lifespan</b>
2021/00110/OBS Screening Request determined EIA (decision 03/03/2021)	700m east	30MW (65MW solar)	96.5ha	Not constructed	40 years
<b>Other Significant Planning Applications</b>					
<b>Application Ref.</b>	<b>Proposal</b>	<b>Distance from Oaklands</b>	<b>Other info</b>		
2019/00435/RG3 (approved 01/09/2019)	Construction of a replacement secondary school building with associated playing fields and parking at the site of the existing Whitmore High School and the demolition of the existing secondary school building upon completion	4.3km south / south east	Work has begun but is not complete (according to Google Earth)		
2019/01041/RG3 (approved 19/12/2019)	Construction of a replacement secondary school	4.2km south / south east	Work has begun but is not		

	building at the site of the existing Pencoedre High School, sports facilities, and associated works (including landscaping, access and engineering works) along with the demolition of the existing secondary school building		complete (according to Google Earth)		
2019/00280/RG3 (approved 27/06/2019)	Erection of extensions to the school for a new Sports Block with link to existing building; Design and Technology Block; new Reception Area; creation of a Plant Room; new Muga and 3G All-weather Pitch as well as external alterations to the facade treatment	4.5km south	Completed (according to Google Earth)		
2019/01177/FUL (approved 26/11/2020)	Development of a Care Home and associated works	3.5km east	Work has begun but is not complete (according		



			to Google Earth)		
2022/00066/RG3 (approved 28/04/2022)	Proposed replacement primary school for 126 pupils plus additional capacity for 24 part-time nursery places, including associated works	800m north	Work has not begun		
<b>Awaiting Decision</b>					
2017/01162/FUL	Proposed continued implementation of planning permission 04/00700/FUL without compliance with Condition No. 1	2.8km east			
2019/00871/OUT	Outline application comprising demolition of existing buildings and erection of 44.79ha Class B1/B2/B8 Business Park, car parking, landscaping, drainage infrastructure, biodiversity provision and ancillary works. All matters reserved aside from access.	4.4km south			

2022/00733/FUL	Erection of 262 new homes, open space, landscaping, access roads and paths and associated infrastructure	5.6km south			
2021/01379/FUL	The winning and working of limestone, importation/recovery of inert waste and restoration to agriculture/amenity	1.7km north west			

- 15.2.14 There is limited potential for the proposed development to create cumulative effects with the above identified schemes that have been consented but not yet implemented or have become operational. This is largely due to intervening distances between sites but also the nature of the solar proposal. Such that it will not generate emissions to atmosphere, ground or hydrology and once constructed, the proposed development, will not generate vehicle movements of any note.
- 15.2.15 Overall cumulative landscape and visual effects are only noted as a result of the additional Parc Dyffryn Solar scheme with the host Oaklands scheme. Effects are concluded to result in cumulative effects of a Not Significant nature. Visual effects would (at the most adverse) be discernible in the view and limited to 'combined - in succession' views in very limited geographical area between both schemes. Landscape effects would be indirect, also focussed to the c.1.6km wide zone between both schemes, a heavily wooded and undulating area. Cumulative landscape effects are concluded to result in a slight additional change, in conjunction with Parc Dyffryn Solar, to landscape character.
- 15.2.16 No further consideration of potential cumulative effect will be given to the identified proposals.

### 15.3 CONCLUSION

- 15.3.1 Overall, the effects of the proposed development are not considered to be significant either by way of the land use and location of the scheme or by virtue of the proposed operation. The potential impacts have been fully assessed for the proposed development and where appropriate mitigated as a result of an iterative review process and through careful consideration of process management, abatement techniques and landscape design. Therefore, as there are no residual impacts which are considered to be significant in terms of intensity or characteristics, as suggested in section 15.2, there is limited potential for the creation of cumulative impacts resulting from the proposed development.



## **16. SUMMARY AND CONCLUSIONS**

## 16.1 CONCLUSION

### Introduction and Background to the Proposal

- 16.1.1 This Environmental Statement (ES) has been prepared on behalf of Sirius Renewable Energy Limited (the “Applicant”) to accompany a planning application for the construction and operation of a Solar farm and Battery Energy Storage System (BESS) across a total area of approximately 127ha. The proposed development encompasses three parcels of land (known as Development Areas) which are located to the west and east of A4226 (Five Mile Lane), approximately 750m to the south of the village Bonvilston and circa 950m southwest of the village of St Nicholas. The Application Site lies c. 12km to the west of Cardiff and is situated within the administrative area of The Vale of Glamorgan in Wales.
- 16.1.2 The The Vale of Glamorgan Local Development Plan allocates the majority of the development areas to the west of Five Mile Lane as a ‘Search Area for Solar Energy’.
- 16.1.3 The solar farm will generate enough electricity to power over 20,400 homes per year and offset approximately 20,200 tonnes of CO<sub>2</sub> every year, the equivalent of taking over 5,000 cars off the road<sup>28</sup>.
- 16.1.4 The BESS will deliver significant environmental benefits, enabling technology for renewable generation, replacing the required for gas fired power generation and providing rapid response power to satisfy peak demand. In performing these roles the development has the ability to reduce carbon dioxide emissions by over 20,600 metric tonnes annually whilst also providing electricity storage equivalent to supplying over 20,800 homes<sup>29</sup>.
- 16.1.5 The panels are to be fixed panels (i.e not tracking panels) and are to be arranged in rows in an east to west alignment. The panels will be angled slightly to the south to maximise efficiency.
- 16.1.6 The total height of the solar panels will be no more than 3m above the ground, with a gap of at least 0.5m above the ground at a minimum.
- 16.1.7 There is a statutory requirement for a 6-week period of pre-application consultation (PAC) in advance of the planning application being submitted to PEDW for acceptance an examination. Within this period, a public exhibition will be held at Bonvilston Reading Room providing details of the proposals along with the opportunity to speak to the project team. As part of the PAC, a project website will be set up, there will be a letter drop in the local area and a newspaper advert will be published. Site notices will also be erected around the site and local area. The consultation methods and feedback will be summarised in a Statement of Community Engagement which will be submitted with the planning application.

## 16.2 BIODIVERSITY ENHANCEMENTS AND LANDSCAPING

- 16.2.1 A key aspect of the proposal is to provide biodiversity enhancements across the site. This and the need for existing planting to reduce potential impacts to visual amenity

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<sup>28</sup> Internal calculations using OFGEM Typical Domestic Consumption Values and BEIS Carbon Conversion Factors

<sup>29</sup> Internal calculations using OFGEM Typical Domestic Consumption Values and BEIS Carbon Conversion Factors

has been informed by the ecological survey works and the Landscape Visual Impact Assessment.

16.2.2 The proposed Landscape Masterplan for the application site can be viewed on Drawing No. **SRE1113/02/18** (Doc Ref. 2.18). The drawing identifies the existing habitats to be retained and how they will be managed. In addition to land between and beneath the panels, there will be some areas of non-deployment land that will be brought under formal management to provide landscape and ecological enhancement for the life of the scheme.

16.2.3 The Landscape and Visual Impact Assessment and ecological assessment (Chapter 7 and 11 of the accompanying ES) provides full details of the enhancement proposal, but in summary these include:

- Management of grassland within the solar deployment zones to create a diverse sward between and around the solar arrays, of tussock grassland;
- Management of grassland margins outside of the solar deployment zones for biodiversity, the grassland fringes (low maintenance perennial meadow mix) will provide enhanced habitat fringes and contribute to increasing biodiversity levels in the local area;
- Reinforce existing hedgerows to improve visual containment of solar deployment areas (gapping up and growth to a greater height) Where appropriate on the boundary adjoining receptors (residential, roads and footpaths) the hedge will be allowed to grow up to at least c.3m tall to help to screen visibility from publicly accessible areas to the solar farm;
- Improve landscape structure of Development Area 1 (Pancross Farm) with the reinstatement of some lost historic hedgerows to restore the historic field structure, for both landscape / visual and ecological benefits;
- Additional standard sized hedge trees to be planted along the new hedgerows within the western area of Development Area 1, the Llancarfen Historic Landscape Area at random spacings. The planting will increase local tree coverage, filter visibility from sensitive receptors and provide green links between existing woodland areas.
- Overall, it has been concluded that a significant net gain of 173.02% in biodiversity is possible across the site.

### 16.3 ENVIRONMENTAL ASSESSMENT

16.3.1 Of the environmental topic areas considered as part of the EIA, the significance of impacts from the proposed operations considered to be greater than negligible are limited to:

- Landscape and Visual;
- Noise and Vibration;
- Historic Environment;
- Ecology; and
- Climate Change.

- 16.3.2 The potential impacts on landscape character and visual amenity were identified during the construction and decommissioning phase as minor (negative) due to the short duration. During the operational phase whilst adverse landscape effects are acknowledged, a moderate significance of landscape effect is concluded, this is not significant in EIA terms. In terms of visual amenity, up to and including major adverse significant impacts will be limited to one locally elevated position along a PROW and focussed to a particular location with the most open visibility.
- 16.3.3 With regards to Noise and Vibration impacts during the construction and decommissioning phases a minor adverse impact is expected. However, this is a temporary impact and measures to control noise will be implemented.
- 16.3.4 In terms of the Historic Environment, during the construction/decommissioning period a temporary moderate adverse impact is predicted on the Registered Historic Landscape of Llancarfan following the implementation of mitigation measures. During the operational period, following implementation of mitigation measures, a moderate adverse impact is predicted on the Registered Historic Landscape of Llancarfan and a minor adverse impact is predicted on Coed y Cwm Ringwork and Castle Ringwork.
- 16.3.5 In terms of ecology, during the construction/decommissioning and operational periods, following implementation of mitigation measures, no significant residual ecological effects have been identified from the scheme. The only residual impacts that have been identified are minor adverse and result from the loss of areas of grassland habitat under the direct footprint of the solar panels. However, through proposed enhancements, a 173% net gain in habitats will be delivered and a 14.81% gain in hedgerows. This is considered a significant beneficial effect.
- 16.3.6 In terms of climate change, during the operational phase of the solar farm the potential impact will be significantly beneficial through the generation of renewable energy. The proposed development will be operational for 40 years, generating significant renewable energy benefits. Following this period, the site will be restored back to agriculture.

## 16.4 CONCLUSION

- 16.4.1 The potential environmental impacts have been fully assessed for the development and where appropriate mitigated as a result of an iterative design process and through careful consideration of process management, abatement techniques, landscape design and biodiversity enhancement. The limited, identified residual impacts would be heavily outweighed by the significant amount of renewable electricity that will be generated, the considerable investment in the local economy and major benefits to local biodiversity.

