BRYN HENLLYS EXTENSION

PROPOSED SOLAR FARM

ENVIRONMENTAL STATEMENT

PREPARED BY PEGASUS GROUP | AUGUST 2019
P18-2622 | LIGHTSOURCE BP

lightsource bp

Pegasus Group

Project Directory **Statement of Competence**

The following competent experts have been involved in the preparation of this Environmental Statement on behalf of Lightsource BP.

EIA Coordination	
Pegasus Group	Pegasus Group is a Member of the Institute of Environmental Management and Assessment (IEMA) and one of the founding members of the IEMA Quality Mark. Competent experts involved in the co-ordination of the Environmental Statement include Chartered members of the Royal Town Planning Institute and IEMA.
Landscape and Visual	
Pegasus Group	Pegasus Group is a Registered Practice with the Landscape Institute. Our Landscape Architects regularly prepare Landscape and Visual Impact Assessments (LVIA) as part of EIA. The LVIA has been prepared by a Chartered Member of the Landscape Institute to ensure compliance with appropriate guidance.
Cultural Heritage	
Pegasus Group	The Heritage team at Pegasus Group specialises in archaeology, built heritage and the historic landscape. The team holds individual memberships of the Royal Town Planning Institute (RTPI), the Institute of Historic Buildings Conservation (IHBC) and the Chartered Institute for Archaeologists (CIfA). The Archaeology and Cultural Heritage chapter was authored and reviewed by members of the CIfA.
Biodiversity	
avian ecology	This chapter has been prepared and separately reviewed by Avian Ecology professional ecologists who are full members of the Chartered Institute of Ecology and Environmental Management (CIEEM) and are experienced in the field of ecological impact assessment.

Transport & Access	
PFA consulting	Competent experts involved in the assessment, preparation and checking of the Traffic and Transport chapter variously have Chartered membership of the Institute of Logistics & Transport (CMILT), Membership of the Chartered Institute of Highways & Transportation (MCIHT) or Membership of the Institution of Civil Engineers (MICE).
Hydrology & Flood Risk	
PFA consulting	Competent experts involved in the assessment, preparation and checking of the Hydrology and Flood Risk chapter variously have full membership of the Chartered Institution of Water and Environmental Management (MCIWEM) and are Chartered Water and Environmental Managers (C.WEM) and Chartered Environmentalists (CEnv) or are Chartered Engineers registered with the Engineering Council).
Ground Conditions	
wardell armstrong	Competent experts involved in the assessment and preparation of the Ground Conditions and Contamination chapter have Chartered membership of the Geological Society (CGeol), Science Council (CSci), Society for the Environment (CEnv), and Institution of Water and Environmental Management (C.WEM).

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1. INTRODUCTION

1.1 INTRODUCTION

1.1.1 This Environmental Statement (ES) has been prepared on behalf of Lightsource BP (the "Applicant") in support of a planning application for the construction, operation and decommissioning of the Bryn Henllys Extension Solar Farm on Land at Waunlwyd Farm, Ystradowen, Swansea (the "Application Site"). The Application Site is situated within the administrative area of Powys County Council (PCC). The Application Site location is shown on **Figure 1.1**.

1.1.2 The proposed solar farm would have an installed capacity of up to 9.9 MW, and act as an extension to the approved, but not yet constructed 20 MW Bryn Henllys solar farm to the immediate east of the Application Site (Planning Reference P/2015/0176).

1.2 EIA REGULATIONS AND PROCEDURES

1.2.1 An Environmental Statement ("ES") is a document that sets out the findings of an Environmental Impact Assessment ("EIA"). An EIA is a process for identifying the "likely significance of environmental effects" (beneficial or adverse) arising from a proposed development, by comparing the existing environmental conditions prior to development (the baseline) with the environmental conditions during/following the construction, operational and, where relevant, the decommissioning phases of a development should it proceed. The EIA is carried out prior to the submission of a planning application.

1.2.2 The statutory requirements for carrying out an EIA, the content of the ES and the procedures for determining planning applications for 'EIA Development' are set out within the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017[1] (as amended) (the "EIA Regulations").

1.2.3 Where an application is made for planning permission for EIA Development, the local planning authority ("LPA") is not permitted under the EIA Regulations to grant planning permission unless it has first taken the relevant environmental information into consideration.

1.2.4 In order to determine if it is necessary to undertake an EIA to accompany a planning application, Regulation 6 of the EIA Regulations makes provision for an applicant to apply to a Local Planning Authority (LPA) for a 'Screening Opinion' as to whether an EIA is required.

Screening Opinion

1.2.5 The EIA Regulations require that any proposed development falling within the categories set out within Schedule 2 should be considered as 'EIA Development' where the development is considered likely to have significant effects on the environment by virtue of such factors as its nature, size or location (Regulation 2).

1.2.6 The Proposed Development falls within the category of "*Industrial installations for the production of electricity, steam and hot water*" under Schedule 2, paragraph 3(a) and accordingly the Applicant has prepared an ES.

[1] The Town and Country Planning (Environmental Impact Assessment (Wales) Regulations 2017 (Amended 2019, SI 2019 No.299 (W.76).

Scoping

1.2.7 In order to determine the scope of an EIA, the EIA Regulations make provision for an applicant to request that the LPA provide a written opinion as to the information to be provided within the ES. This ES addresses those environmental issues which are considered pertinent and that could potentially result in "likely significant effects" as stated in the EIA Regulations. The Applicant submitted a request for scoping opinion to PCC on 6th June 2019 (Ref 19/0966/SC), with a response received on 1st August 2019. Details of the scoping exercise carried out with regards the Proposed Development is set out in **Chapter 2: Assessment Scope and Methodology**.

1.3 STRUCTURE OF ENVIRONMENTAL STATEMENT

1.3.1 This ES comprises studies on each of the aspects of the environment identified as likely to be significantly affected by the Proposed Development (the 'technical chapters'), which are supported with figures and technical appendices where appropriate.

1.3.2 This ES is structured as follows:

- **Environmental Statement Volume 1: Main Text -** Comprises the main text of the ES, including 'general chapters' that describe the EIA context, provide a description of the Application Site and Proposed Development, and set out the scope of the ES. This is followed by the 'technical chapters' for each environmental theme with the associated figures. The volume concludes with a summary.

- **Environmental Statement Volume 2: Technical Appendices** Comprises the technical appendices supporting the main report.

- **Environmental Statement: Non-Technical Summary (NTS)** – this provides a concise summary of the ES identifying the likely significant environmental effects and the measures proposed to mitigate or to avoid adverse effects of the Proposed Development.

1.3.3 The ES Main Text is split into the following chapters:

- Chapter 1 Introduction
- Chapter 2 Assessment Scope and Methodology
- Chapter 3 The Application Site and Proposed Development
- Chapter 4 Alternatives
- Chapter 5 Landscape and Visual
- Chapter 6 Biodiversity
- Chapter 7 Cultural Heritage & Archaeology
- Chapter 8 Transport and Access
- Chapter 9 Hydrology, Flood Risk and Drainage
- Chapter 10 Ground Conditions and Contamination
- Chapter 11 Summary

EIA Consultant Team

1.3.4 The EIA Regulations set out the requirements for EIA applications to be accompanied by confirmation that the Environmental Statement has been prepared by competent experts.

1.3.5 The ES has been co-ordinated and managed by Pegasus Group Limited. Pegasus is accredited under the Institute of Environmental Management and Assessment (IEMA) 'Quality Mark' scheme which is a mark of excellence in EIA co-ordination and management. Pegasus Group have extensive experience of undertaking EIA work across a range of projects and development types including energy and renewable energy schemes.

1.3.6 The consultants who have contributed to the preparation of this ES are referenced in the project directory at the front of this document, along with information demonstrating their "sufficient expertise to ensure the completeness and quality of the ES" in accordance with the EIA Regulations.

1.4 ENVIRONMENTAL STATEMENT AVAILABILITY AND COMMENTS

Availability

1.4.1 This ES should be made available by PCC for public viewing during normal office hours. For details of where it can be viewed and viewing times please contact PCC who can be contacted by:

Planning Services
Powys County Hall
Spa Road East
Llandrindod Wells
Powys
LD1 5LG
Email: planning.services@powys.gov.uk

Telephone: 01597 827161 / 01938 551259

1.4.2 The ES and planning application documents may also be available to view on the Council's website (Online Planning Register[2]) during its consideration of the submitted application.

1.4.3 Alternatively, the ES may be purchased, the costs for which are set out below:

- Main Text and Technical Appendices- £150
- Non-Technical Summary (NTS) - Free of charge
- Digital copies of the above documents on a CD - £10

1.4.4 Postage is payable on all orders. For copies of any of the above please contact Pegasus Group (quoting reference P18-2622) at the following address:

Pegasus Group
Pegasus House
Querns Business Centre
Whitworth Road
Cirencester
Gloucestershire
GL7 1RT
Telephone: 01285 641717
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Comments

1.4.5 Comments on the planning application should be forwarded to PCC during its consideration and determination of the planning application.

[2] https://pa.powys.gov.uk/online-applications/?lang=EN

2 ASSESSMENT SCOPE AND METHODOLOGY

2.1 INTRODUCTION

2.1.1 This chapter explains the methodology used to prepare the technical chapters of this ES and describes its structure and content. In particular, it sets out the process of identifying and assessing the likely significant environmental effects of the development.

2.2 GENERAL APPROACH TO ENVIRONMENTAL STATEMENT

2.2.1 The Environmental Statement must contain the information specified in regulation 17(3) and must meet the requirements of Regulation 17(4). It must also include any additional information specified in Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (as amended)[1] (the "EIA Regulations") which is relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

2.2.2 Regulation 17(3) and 17(4) states: -

> (3) An environmental statement is a statement which includes at least—
>
> (a)a description of the proposed development comprising information on the site, design, size and other relevant features of the development;
>
> (b)a description of the likely significant effects of the proposed development on the environment;
>
> (c)a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
>
> (d)a description of the reasonable alternatives 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 the option chosen, taking into account the significant effects of the development on the environment;
>
> (e)a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and
>
> (f)any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.
>
> (4) An environmental statement must—
>
> (a)be prepared by persons who in the opinion of the relevant planning authority or the Welsh Ministers, as appropriate, have sufficient expertise to ensure the completeness and quality of the statement;
>
> (b)contain a statement by or on behalf of the applicant or appellant describing

[1] The Town and Country Planning (Environmental Impact Assessment (Wales) Regulations 2017 (Amended 2019, SI 2019 No.299 (W.76).

the expertise of the person who prepared the environmental statement;

(c)where a scoping opinion or direction has been issued in accordance with regulation 14 or 15, be based on the most recent scoping opinion or direction issued (so far as the proposed development remains materially the same as the proposed development which was the subject of that opinion or direction);

(d)include the information reasonably required for reaching a reasoned conclusion on the significant effects of the development on the environment, taking into account current knowledge and methods of assessment; and

(e)take into account other relevant environmental assessments required under Union legislation or any other provision of domestic legislation, with a view to avoiding duplication of assessment.

2.2.3 Schedule 4 states: -

Information for inclusion in environmental statements

1. Description of the development, including in particular—

(a)a description of the location of the development;

(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;

(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;

(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.

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.

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.

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 adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and

landscape.

5. A description of the likely significant effects of the development on the environment resulting from, inter alia—

(a)the construction and existence of the development, including, where relevant, demolition works;

(b)the use of natural resources in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;

(c)the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances and the disposal and recovery of waste,

(d)the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

(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;

(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;

(g)the technologies and the substances used.

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(1) and Directive 2009/147/EC(2).

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.

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.

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.

9. A non-technical summary of the information provided under paragraphs 1 to 8.

10. A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.

2.2.4 Accordingly, this ES comprises the following information:

- A description of the development comprising information about the site including the nature, size and scale of the development;
- The data necessary to identify and assess the main effects which the development is likely to have on the environment;
- A description of the likely significant effects of the development covering, direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects, explained by reference to the development's possible effect on cultural and archaeological heritage, landscape and the interaction between any of the foregoing material assets (as appropriate).
- Where significant adverse effects are identified with respect to any of the foregoing, mitigation measures will be proposed in order to avoid, reduce or remedy those effects; and
- A summary in non-technical language of the information specified above.
- A statement outlining the relevant experience of the experts who have undertaken the assessment and drafted the technical chapters within the ES.

2.3 DESCRIPTION OF THE DEVELOPMENT

2.3.1 The development, which has been the subject of this ES is described in detail within **Chapter 3** which also sets out the parameters and controls defining those aspects of the development capable of having significant environmental effects, as defined by the EIA Regulations.

2.4 CONSIDERATION OF ALTERNATIVES

2.4.1 The ES provides a chapter which details the reasonable alternatives considered by the applicant. This is presented at **Chapter 3.**

2.5 SCOPE OF ENVIRONMENTAL IMPACT ASSESSMENT

2.5.1 The Applicant submitted a request for scoping opinion to PCC on 6th June 2019 (Ref 19/0966/SC), with a response received on 1st August 2019.

2.5.2 The scope of information and assessment supplied within the ES is considered to provide a clear understanding of the potential significant effects of the development upon its environment and the mitigation measures proposed to avoid or ameliorate those effects. The information, scope and knowledge required to undertake the EIA has been acquired from a number of varied sources to ensure that all impacts, whether explicit from the outset or coming to light during the projects; development, were appropriately assessed as part of the Environmental Impact Assessment process or as standard technical documentation that support the wider planning application submission. These sources include: -

- PCC's Scoping Opinion (See **Appendix 2.1**).
- Discussion with statutory consultees
- Specialist studies
- Expert knowledge of the Applicant and consultant team with regards to their technical subject and experience of renewable energy schemes of similar scale elsewhere in the United Kingdom.

2.5.3 The environmental themes scoped into or out of the Environment Impact Assessment are given in **Table 2.1.**

Table 2.1: Environmental Themes Scoped In / Out

Environmental Theme	Scoped In/Out	How/ Where Addressed / Reason for Scoping Out
Population	In and Out	During construction, it is considered unlikely that the proposals will result in a significant change in population as workers are unlikely to relocate to the area on a permanent basis. The construction will have a temporary effect on employment provision through the creation of construction jobs. A minor beneficial effect is therefore anticipated. Once operational, the proposed development does not provide any permanent residential accommodation and accordingly will not have a significant effect on population. The only vehicle movements will be from the occasional maintenance vehicle that would have negligible influence on the surrounding population. Other effects which could affect human beings, for example Landscape and Visual (**Chapter 5**), Transport and Access (**Chapter 8**), Hydrology, Flood Risk and Drainage (**Chapter 9**) and Ground Conditions and Contamination (**Chapter 10**) are discussed in the relevant technical chapters.
Human Beings	In and Out	Potential impacts during constructions works, i.e. lighting of external works, dust/noise from vehicles/construction processes, surface water run-off from bare earth/stockpiles, plant noise etc are addressed in Chapter 4 and the relevant Technical Chapters where it is considered that construction activities can be appropriately controlled to an acceptable level through the adoption of construction best practice and appropriate safety measures. There would therefore be no unusual risk to human health and significant effects are not anticipated. During operation there would be no unusual risk to human health. The development relies on well-established, safe modern technology and correct Health and Safety signage will be displayed on the site to inform of the potential risk from working near electrical equipment and to discourage trespass.

Environmental Theme	Scoped In/Out	How/ Where Addressed / Reason for Scoping Out
		Other effects which could affect human beings, for example Landscape and Visual (**Chapter 5**), Transport and Access (**Chapter 8**), Hydrology, Flood Risk and Drainage (**Chapter 9**) and Ground Conditions and Contamination (**Chapter 10**) are discussed in the relevant technical chapters.
Biodiversity	In	Assessed within the Biodiversity Chapter (**Chapter 6**).
Land	In	The majority of the Application Site contains land utilised for agricultural purposes that is under regular change of agricultural grade 4 & 5. The solar panels are a temporary and reversable feature, after which they would be decommissioned allowing the site's former agricultural use to be restored, with no likely significant lasting adverse impacts. Considering the nature of the construction and operation of a solar farm, the development would lead to a limited loss of natural resources, thus significant impacts are not anticipated on the land. Factors relating to ground conditions and the control of contamination risks in construction are discussed in the Ground Conditions and Contamination Chapter (**Chapter 10**).
Soil	In	Due to the nature of solar farms, it is unlikely that the construction of the proposed development would lead to the loss of soils as appropriate construction techniques will be implemented to reduce below ground works. Furthermore, most of the soil will not be physically impacted from the development and therefore its degradation is considered unlikely. Factors relating to ground conditions, soils and the control of contamination risks in construction are discussed in the Ground Conditions and Contamination Chapter (**Chapter 10**).
Water	In	Assessed in the Hydrology, Flood Risk and Drainage Chapter (**Chapter 9**).
Air	Out	Whilst there may be dust generated during construction, this can be reduced using construction management measures. Therefore, it is considered unlikely that the proposals will have a significant effect on air quality during construction. The only vehicle movements in operation would be from the occasional maintenance vehicle that would not give rise to a significant effect on air quality.

Environmental Theme	Scoped In/Out	How/ Where Addressed / Reason for Scoping Out
		Due to the nature of the development, once operational there would be no emissions generated by the development. No significant effects are therefore anticipated and this topic is therefore scoped out of the ES.
Climate	In	It is acknowledged that construction of the proposed development will result in the gaseous emissions associated with construction vehicles. Although, considering the temporary nature of construction it is considered that these emissions are unlikely to be complex or significant. Due to the nature of the development, once operational the facility will be generating energy from renewable sources (sunlight). Therefore, the development will only contribute positively to the local climate through reducing the requirement for fossil fuel-based energy production facilities. A positive effect is therefore anticipated. Due to the low number of predicted operational maintenance traffic movements coupled with the low carbon nature of the proposed development, significant effects from greenhouse gas emissions to air quality receptors during operation is unlikely to occur and as such can be scoped out. Climate change is however considered accordingly within **Chapter 3 (Application Site and Proposed Development**) and relevant disciplines such as the Hydrology, Flood Risk and Drainage (**Chapter 9**).
Material Assets	Out	Construction would require the use of natural resources as is standard with construction works, i.e. power/water/construction materials. This is not considered to be an unusual or complex operation and accordingly no significant effects are anticipated. Due to the nature of the development, no natural resources would be required for the operation of the facility once constructed. No significant effects are therefore anticipated.
Cultural Heritage(including Architectural and Archaeological aspects)	In	Assessed within with the Cultural Heritage and Archaeology Chapter (**Chapter 7**).
Landscape	In	Assessed in the Landscape and Visual chapter (**Chapter 5**).

Environmental Theme	Scoped In/Out	How/ Where Addressed / Reason for Scoping Out
Risks of Major Accidents and Disasters	Out	The nature, scale and location of the Proposed Development is not considered to be vulnerable to or give rise to significant impacts in relation to the Risk of Accidents and Major Disasters. Due to the above significant effects are unlikely to occur and as such can be scoped out. This topic is however considered accordingly within **Chapter 3** (Application Site and Proposed Development).
Interelationship between above factors	In	Assessed within each topic chapter under the heading Cumulative and In-Combination Effects.

2.5.4 PCC's Scoping Opinion, including consultee responses, is reproduced in full at **Appendix 2.1**. Any subsequent discussions regarding the scope of the assessment that has been undertaken separately to the EIA scoping process, is discussed within the relevant technical chapters.

2.6 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

2.6.1 The content of the ES is based on the following:

- Review of the baseline situation through existing information, including data, reports, site surveys and desktop studies;
- Consideration of Planning Policy Wales Edition 10 (2018) and accompanying Planning Guidance (Wales), Technical Advice Notes, Circulars and the statutory Development Plan;
- Consideration of potential sensitive receptors;
- Identification of likely significant environmental effects and an evaluation of their duration and magnitude;
- Expert opinion;
- Modelling;
- Use of relevant technical and good practice guidance; and
- Specific consultations with appropriate bodies.

2.6.2 Environmental effects have been evaluated with reference to definitive standards and legislation where available. Where it has not been possible to quantify effects, assessments have been based on available knowledge and professional judgment.

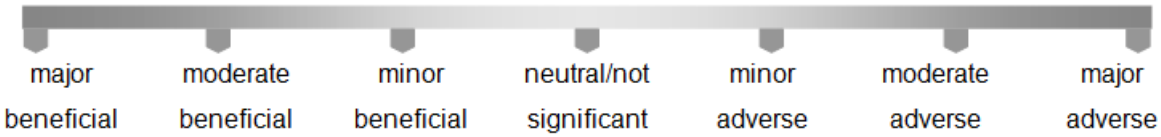
2.7 DETERMINING SIGNIFICANCE

2.7.1 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

- Neutral / Negligible – a neutral effect to an environmental resource or receptor.

2.7.2 Each technical chapter defines discipline specific 'likely significant effects' by the use of pre-determined assessment criteria. Individual disciplines stipulate the specific assessment criteria used within their own technical chapters under Assessment Approach; however in broad terms, environmental effects can be described as adverse, beneficial or neutral on a sliding scale, for example, major-moderate-minor-negligible.



2.7.3 In many technical disciplines, significance reflects the relationship between two factors:

- The magnitude or severity of an effect (i.e. the actual change taking place to the environment); and
- The sensitivity, importance or value of the resource or receptor.

2.7.4 Specific separate criteria for determining the degree of 'magnitude' and the degree of 'sensitivity' (or importance or value) is clearly defined within each technical chapter, and again is often on a sliding scale (e.g. high-medium-low).

2.7.5 The broad criteria for determining magnitude are set out in **Table 2.3**

Table 2.3: Degrees of Magnitude and their 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.

2.7.6 The sensitivity of a receptor is based on the relative importance of the receptor using the scale in **Table 2.4.**

Table 2.4: Degrees of Sensitivity and their 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.

2.7.7 The significance of a particular effect can then be derived from the interaction of the receptor's sensitivity and the magnitude of change likely to be experienced.

2.7.8 An example of a 'matrix' process is indicated below in **Table 2.5.** However it should be noted that this is provided as a general guide only. Discipline-specific methodology is often used rather than generic criteria, as it is recognised that broad criteria does not always cater for particular disciplines, particularly where best practice and guidance require subtle differences. All significance criteria is clearly explained within each technical chapter under the heading of Assessment Approach.

Table 2.5: Example degrees of Significance based on Magnitude/Sensitivity

Magnitude of Change	Sensitivity of Receptor				
		High	**Medium**	**Low**	**Negligible**
	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor to Moderate	Negligible
	Low	Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

2.7.9 Significance of effects would be assigned both before and after mitigation where relevant.

2.8 MITIGATION

2.8.1 Standard measures and the adoption of construction best practice methods to avoid, minimise or manage adverse environmental effects, or to ensure realisation of beneficial effects, are assumed to have been incorporated into the design of the Proposed Development and the methods of its construction from the outset. Further information on the standard measures and construction best practice is detailed in **Chapter 3: The Application Site and Proposed Development.** Where outlined, the assessment is of the Proposed Development incorporating these measures.

2.8.2 Where mitigation measures are proposed that are specific to an environmental theme (e.g. ecological measures incorporated into the landscaping scheme etc) and are purposely incorporated into the design, these are highlighted within the relevant technical chapter as 'mitigation by design' (or 'integral/embedded mitigation') and may be subject to appropriate planning conditions or obligations.

2.8.3 Where the assessment of the Proposed Development has identified potential for adverse environmental effects, the scope for mitigation of those effects, for example by way of compensatory measures, has been considered and is outlined in the appropriate technical chapter. It is assumed that such measures would be subject to appropriate planning conditions or obligations.

2.8.4 Where the effectiveness of the mitigation proposed has been considered uncertain, or where it depends upon assumptions of operating procedures, then data and/or professional judgment has been introduced to support these assumptions.

2.9 CUMULATIVE AND IN-COMBINATION EFFECTS

Cumulative Effects

2.9.1 Within EIA, cumulative effects are generally considered to arise from the combination of effects from the Proposed Development and from other proposed or permitted schemes in the vicinity, acting together to generate elevated levels of effects. Examples of these kinds of effects that can be readily appreciated could include:

- Traffic generated from developments, affecting the surrounding road network;
- Landscape and Visual effects; and
- Discharges to the water environment.

2.9.2 With respect to inter-project cumulative effects, the EIA Regulations state that consideration should be given to "other existing and/or approved projects" (Schedule 4, paragraph 5(e)).

2.9.3 Relevant developments considered with regards cumulative effects are the approved 20MW solar installation (Planning Reference P/2015/0176) to the east of the Application Site. No other consented or planned developments, subject to a valid planning application have been identified that would be considered as having significant cumulative effects in combination with the Proposed Development. This location of this development is shown on **Figure 1.1.**

In-Combination Effects

2.9.4 In-combination effects arise where effects from one environmental element bring about changes in another environmental element. These effects are also reviewed in each of the technical chapters of this ES. Examples of the main types of interactive effects are as follows:

- Effects of traffic on noise;
- Effects of traffic on air quality;
- Effects of water discharges on ecology;
- Effects of landscaping on ecology;
- Effects of waste on traffic; and
- Effects of land contamination on air and water quality.

2.10 GENERAL ASSUMPTIONS & LIMITATIONS

2.10.1 The principal assumptions that have been made and any limitations that have been identified in preparing this ES are set out below:

- The principal land uses adjoining the Application Site remain as at the present day, except where redevelopment proposals have been granted planning consent. In those cases it is assumed the redevelopment proposals will be implemented or would but for the development being implemented;
- Information received from third parties is complete and up to date;
- The design, construction and completed stages of the Proposed Development will satisfy legislative requirements; and
- Conditions, or other legal obligations, will be attached to the planning permission to secure 'mitigation', where considered necessary to make the Proposed Development acceptable.

2.11 STRUCTURE OF TECHNICAL CHAPTER

2.11.1 Throughout the EIA process, the likely significant environmental effects of the development will be assessed. Within each of the technical chapters the information which will inform the EIA process has generally been set out in the following way:

- Introduction – to introduce the topic under consideration, state the purpose of undertaking the assessment and set out those aspects of the development material to the topic assessment;
- Assessment Approach – to describe the method and scope of the assessment undertaken and responses to consultation in relation to method and scope in each case pertinent to the topic under consideration;
- Baseline Conditions – a description of the baseline conditions pertinent to the topic under consideration including baseline survey information;
- Assessment of Likely Significant Effects - identifying the likely effects, evaluation of those effects and assessment of their significance, considering both construction and operational and direct and indirect effects;
- Mitigation and Enhancement - describing the mitigation strategies for the significant effects identified and noting any residual effects of the proposals;
- Cumulative and In-combination Effects - consideration of potential cumulative and in-combination effects with those of other developments; and
- Summary – a non-technical summary of the chapter, including baseline conditions, likely significant effects, mitigation and conclusion.

3 APPLICATION SITE AND PROPOSED DEVELOPMENT

3.1 INTRODUCTION

3.1.1 This chapter of the ES provides a description of the Application Site and the Proposed Development.

3.2 APPLICATION SITE CONTEXT

3.2.1 The Application Site is located approximately two miles north-west of the town of Ystradgynlais in south-west Powys. The locality is dominated by grass-covered agricultural fields with some woodland and the settlements of Ystradowen, Cwmllynfell to the west and Cwm-twrch-Uchaf to the south.

3.2.2 There are no sensitive sites as defined by the EIA Regulations located within or immediately adjacent to the site. The nearest designations surrounding the Application Site include: -

- The Brecon Beacons National Park located c. 150 m to the north of the Application Site. The National Park boundary is broadly concurrent with the linear woodland belt located beyond the intervening fields next to the Application Site.
- Cwm Twrch SSSI located c. 140 m to the west of the Application Site at its closet point.

3.2.3 The site is not located within or in proximity to any World Heritage Sites, Landscapes of Historic Interest, Registered Park and Gardens, Conservation Area or Heritage Coast. The closest designated heritage assets to the Application Site comprise Grade II listing buildings described as: -

- Henllys Vale Colliery Limekilns (large bank of lime kilns associated with the quarries on the Black Mountain) located c. 1.3km to the north.
- Henllys Vale Colliery Chimney (Colliery chimney built for Henllys Vale Colliery, an anthracite drift mine that operated from 1898 to 1918) located c.1.3km to the north.
- Henglyn Isaf (Early C18 thatched farmhouse, one of the older surviving houses around Ystradgynlais) located c.1.3km east.

3.2.4 A number of other Grade II listed buildings are also located within 3 km of the Application Site. There are three Scheduled Ancient Monuments located within 3 km of the Application Site including:

- Dorwen standing stone
- Llwyncwmstabl round cairn
- Cwm Twrch settlement

3.2.5 The closest nationally designated Site of Special Scientific Interest (SSSI) is the Cwm Twrch SSSI located c. 140 m to the west of the Application Site at its closest point. This SSSI is designated for its geological interests only. No other statutory protected sites are located within 2km from the Application Site. In relation to non-statutory sites there are six Sites of Importance for Nature Conservation (SINCs) within a 2km radius of the Application Site boundary, the closest of which is Pant-y-Brwyn SINC, located approximately 500m to the west.

3.3 APPLICATION SITE

3.3.1 The Application Site covers an area of approximately 25.6 ha at Waun-lwyd Farm, Ystradowen, Swansea. The Application Site boundary is identified on **Figure 3.1.**

3.3.2 The Application Site forms two parcels of land compromising a number of pastoral fields currently used for grazing livestock and are connected by an access track:

- The 'northern parcel' is c. 13.1 ha (32.4 acres) and comprises four irregular shaped fields. The Afton Twrch lies to the west of the parcel within dense woodland near to the Application Site's western boundary with the remaining field boundaries formed by hedgerows. The property known as Waun-lwyd is adjacent to the western boundary of the parcel and an aggregate compound also lies to the south west. Further fields are present to the north and east. A water reservoir is located to the east of the parcel, enclosed by areas of woodland,
- The 'southern parcel' is c. 11.3 ha (27.9 acres) and comprises five fields of varying shapes and sizes. The Afton Twrch lies to the west of the parcel. Field boundaries are defined by mature and established hedgerows with frequent hedgerow trees. Further fields are present to the south, beyond which lies a number of isolated properties to the south and southeast.

3.3.3 The site slopes broadly north / northeast to south / southwest. The topography rises from 161 m Above Ordnance Datum (AOD) to the south to 190m AOD at the northwest corner and 196m AOD to the northeast corner of the Application Site.

3.3.4 To the immediate east of the Application Site ('southern parcel') planning permission has been granted for a 20MW solar installation (Planning Reference P/2015/0176). The Proposed Development forms an extension to this solar installation.

3.3.5 An area of Ancient Woodland is located directly to the west of the Application Site.

3.3.6 The Application Site is not considered to be at risk from River or Sea flooding based on Natural Resources Wales (NRW) mapping. The Afon Twrch lies approximately 150m west of the Application Site at the bottom of the valley. Nant Gwyns lies further south of the southern parcel a distance of approximately 700m. Parts of the site are noted as being susceptible to Surface Water flooding based on detailed NRW mapping. These areas are associated with low lying areas in the northern development parcel. The Application Site is crossed by a number of drainage channels, which follow the landform, in conjunction with hedgerows used as agricultural boundaries for adjoining field. Small to mediums ponds are located within or close to the Application Site boundaries, and there is small reservoir approximately 250m east of the northern parcel. The Application Site does not lie within a Groundwater Source Protection Zone.

3.3.7 According to the Welsh Agricultural Land Classification Map the Application Site forms predominantly Grade 4 land with some Grade 5.

3.3.8 The Application Site is currently accessed via Pen-Y-Craig Rdm and the existing farm track for Waunlwyd Farm Farm. The access road between the two parcels of land crosses the valley of the River Twrch, west of the Application Site, to connect with the A4068.

3.3.9 There are a number of Public Rights of Way near to the Application Site, these include footpaths and Byways Open to all Traffic (BOAT's). The footpaths run

outside of, and along parts of the eastern and western boundaries of the Application Site, but do not cross the fields which would host the proposed solar panels and site infrastructure. The footpaths near to the Application Site's western boundary pass through the adjacent woodland and the footpaths to the east run alongside the field boundaries, connecting to a further network of Public Rights of Way in the surrounding area. The existing access track that bisects the northern and southern parcels of the Application Site is a BOAT (PRoW 090/7/2) and is orientated a broadly east-westly alignment where part of this route also coincides with the proposed access. Areas of Open Access Land (Registered Common Land) are located to the north of the site, within the Breacon Beacons National Park, at approximately 800m to the north east at the closest point.

3.4 PROPOSED DEVELOPMENT DESCRIPTION

3.4.1 The Proposed Development is shown on **Figure 3.2**. The Proposed Development will have an installed capacity of up to 9.9 MW, to act as an extension to the 20 MW approved solar farm to the immediate east of the Application Site (Planning Reference P/2015/0176), also managed by Lightsource BP.

3.4.2 The Proposed Development comprises the following key components:

- Vehicular access from the unnamed road east of the A4068;
- Solar panels will be mounted on metal frames. The lower edge of a solar panel will be 1m from the ground and the highest point is 2.9m from the ground;
- A 2m high timber & post/deer fence around the Application Site;
- CCTV cameras will be positioned on 2.5m high poles along the security fence;
- Switchgear substations (4.2m x 2.6m x 3m);
- Transformers (5.5m x 4.5m x 3m);
- AC Boxes (1.2m x 4.2m x 2m)
- Access tracks will be 3.5m wide and made of crushed aggregate (See accompanying planning drawings).

3.4.3 The photovoltaic panels would be laid out in straight arrays set at an angle of approximately 25 degrees. The top north edges of the panels is 2.9 m above ground level. For the purpose of assessment, the top height will be set at 3 m. The lower edges of the panels would be approximately 1 m above ground level. The arrays would be static. The positioning of the arrays respond to existing physical features (e.g. topography) and separation distances are provided between such features, these include ditches, overshadowing, rights of way, biodiversity considerations and tree root protection areas. The separation distances have been guided by technical studies and consultation with relevant bodies.

3.4.4 The metal framework that houses the solar modules would be fixed into the ground by posts. The posts will be driven into the ground (by either direct piling or screw piling) to a depth of around 1.5 m dependent on localised ground conditions.

3.4.5 Four transformers and four switchgear substations would serve the proposed development (two each in the northern parcel and two each in the southern parcel). These would be mounted on concreate platforms (up to 0.2m in height). The proposed colour scheme for the switchgear substations, transformers and AC boxes is RAL 6005 Moss Green.

3.4.6 The arrays would be set within a 2m high timber & post / deer stock fence around the Application Site. The stock fence is fitted with small mammal gates (0.25m x 0.2m) fitted at appropriate points near the bottom of the fence to enable free access.

3.4.7 The security measures that will accompany the scheme include CCTV. CCTV cameras will be positioned on 2.5m high poles along the security fence. The location of the CCTV cameras are shown on **Figure 3.2**.

3.4.8 All onsite cabling would be concealed and laid underground in trenches of approximately 0.4-0.6m deep. All cables would be buried according to current best practice, including soil handling techniques. Cable routes would run alongside access tracks where-ever possible. Where cable traverse field boundaries, micrositing will take place to allow the developer to run the cables through existing gaps in the hedgerows.

3.4.9 The application proposal also includes a package of landscape, ecological and biodiversity benefits. Land between and beneath the panels would continue be used for sheep grazing.

3.5 OPERATIONAL LIFESPAN

3.5.1 The development would export renewable energy to the grid for 40 years.

3.6 CONSTRUCTION COMPOUND & PROGRAMME

3.6.1 The same construction access and construction compound will be used for the Proposed Development as for the approved Bryn Henllys solar farm, with materials transferred within Bryn Henllys and the Application Site.

3.6.2 The temporary construction compound would therefore be located within the approved and adjacent Bryn Henylls site.

3.6.3 The same construction access will be used for Bryn Henllys Extension as for Bryn Henllys solar farm, with materials transferred through Bryn Henllys solar farm and Bryn Henllys Extension using telehandlers. The construction of Bryn Henllys Extension would be undertaken at the same time as Bryn Henllys solar farm, by means of an extended construction period. Bryn Henllys Extension construction would take approximately 3 months.

3.7 ACCESS AND TRAFFIC MANAGEMENT

3.7.1 The approved Bryn Henllys solar farm is located immediate east of the southern parcel of the Application Site, with access to the Application Site proposed through Bryn Henllys solar farm.

3.7.2 Bryn Henllys solar farm, takes access from the existing access from Palleg Road. This existing access was used for the previous open cast minerals extraction which ceased in 2003, as such is of a standard and scale to accommodate regular HGV traffic.

3.7.3 The volume of traffic which will occur during the construction of the development has been calculated having regard to estimated volumes of materials needed to be imported to the site. These estimates have been based on worst case assumptions so as to consider the maximum potential effects. The estimated breakdown of the delivery of materials, components and construction plant can be summarised as follows:

• Delivery of Mounting Frames	20 deliveries
• Delivery of Modules	35 deliveries
• Delivery of Cabinets	35 deliveries
• Delivery of Cables	30 deliveries
• Plant Equipment/Recycling	80 deliveries
• Delivery of Gravel/Hardcore	50 deliveries
• Total	250 deliveries

3.7.4 It is assumed that plant will be brought to the Application Site at the beginning of the construction period and remain on the Application Site until construction is complete.

3.7.5 Over the construction period of the solar farm it is it is estimated that the Application Site will typically generate up to 4 HGV deliveries (8 HGV movements) per day.

3.7.6 It is expected that construction hours of operation will be between 08:00 and 18:00 Monday to Friday and 08:00 and 16:00 on Saturday. Within this period, construction deliveries can be controlled to occur outside peak hours of 08:00-09:00 and 17:00-18:00 to avoid conflict with peak periods on the local highway network on approach to the site.

3.7.7 All workforce vehicles are assumed to be light vehicles (cars, vans or minibuses) and are likely to give rise to approximately 10 vehicle movements at the beginning of each working day (with a similar number at the end of the day), with occasional movements throughout the remainder of the day.

3.7.8 Trips associated with decommissioning would be less than those associated with construction, since landscaping will remain in place, and the number of HGV trips will therefore be correspondingly reduced.

3.8 CONSTRUCTION METHODOLOGY

3.8.1 Preliminary works in the form of site set-up and the implementation of any required ecological protection works would be carried out in accordance with construction standard best practice and ecological guidance and/or license as appropriate to the species/habitat (where required).

3.8.2 The proposed construction measures form part of the 'Standard measures and the adoption of construction best practice methods' as referred to in the Assessment Approach (see Chapter 2). This would include:

- Details of the site set-up, site compound facilities and services;
- Prohibited or restricted operations (location, hours etc.);
- Details of construction operations highlighting any operations likely to result in disturbance and/or working hours outside the core working period, with an indication of the expected duration of key phases and dates;
- The details of proposed routes for HGVs travelling to and from the Application Site;
- Details of all works involving interference with a public highway, including temporary carriageway/footpath closures, realignment and diversions;
- Housekeeping procedures and environmental control measures;
- Procedures for managing environmental risks and responding to environmental incidents;

- Baseline levels for noise, vibration and/or dust and details of any monitoring protocols that may be necessary during the construction works (where specifically requested by the Council);
- Standard measures to control and mitigate potential for noise, dust, air quality and water pollution (see below);
- Standard measures for the management of run-off due to construction activities to reduce the risk of pollution and elevated flood risk both on and off site;
- Measures to maintain flow in the watercourse and protect water quality;
- Any requirement for monitoring and record keeping;
- Contact details during normal working hours and emergency details outside working hours;
- The mechanism for the public to register complaints and the procedures for responding to complaints;
- Provision for reporting, public liaison, prior notification etc; and
- Procedures for regular dialogue with the Council, relevant authorities and the local community.

3.8.3 The standard construction best practice measures would include:

- Selection of construction methodologies to minimise generation of noise, vibration and/or dust;
- All vehicles and/or plant to be switched off when not in use;
- All vehicles and/or plant to be used in accordance with the manufacturer's instructions and subject to regular maintenance;
- The site compound / storage of materials to be appropriately sited to reduce environmental risk and appropriately secured;
- Stockpiles of soil materials to be appropriately sited to reduce environmental risks, of an appropriate height/batter to avoid slippage, with appropriate surface water management and subject to dust control measures;
- Implementation of surface water drainage traps/attenuation, where required, with appropriate arrangements for discharge and/or collection (as appropriate);
- All liquids and solids of potentially hazardous nature (e.g. diesel fuels, oils and solvents) to be stored on surfaced areas with appropriate bunding to reduce the risk of spillage;
- Use of plant that may give rise to nuisance (noise and/or dust) to be adequately screened (where deemed necessary);
- Wheel and/or vehicle body washing facilities to be used to prevent tracking out of mud/dust onto the public highway using wheel wash or wash skip out as appropriate (where deemed necessary);
- Deployment of a road sweeper/road cleaning for use on the public highway (where deemed necessary);
- Programme of cleaning traffic management cones, lights and signs where deployed (as necessary); and
- Vehicles carrying materials to/off-site to be enclosed and/or sheeted as appropriate.

3.8.4 The requirement to comply with the procedures set out within the CMP/CEMP will be included as part of the contract conditions for each element of the work including the supply chain as appropriate. All contractors tendering for work will

be required to demonstrate that their proposals can comply with the procedures and current best practice techniques.

3.8.5 Any proposed departures from the agreed CMP/CEMP will be submitted to the Council, relevant authorities and affected parties in advance.

3.9 OPERATION

3.9.1 During the operational phase, the activities on site would amount to servicing of plant and equipment and vegetation management.

3.10 DECOMMISSIONING

3.10.1 After a 40 year generation period the development would be decommissioned. All solar panels, transformer units, fencing, security measures will be removed.

3.11 ACCIDENTS OR DISASTERS

3.11.1 The ES should also include a description and assessment of the likely significant effects resulting from potential accidents or disasters applicable to the development proposal. The development is not considered likely to cause a significant accident or disaster risk during either the construction, operation and decommissioning phases.

Construction and Decommissioning

3.11.2 The risk both to construction workers and the general public is low and not significant during the construction and decommissioning phases. This would be regulated by the Health and Safety Regulations and the construction (Design and Management) Regulations 2015. The construction of the Development would be managed in accordance with the Health and Safety at Work Act 1974 and would comply with all other relevant Health and Safety Regulations, including the Construction (Health, Safety and Welfare) Regulations 1996 and Electricity Safety, Quality and Continuity Regulations 2002.

Operational Phase

3.11.3 When operational the majority of the Development comprises solar PV modules which are inert. Electrical infrastructure will be located across the Development, in the form of inverters, transformers and cabling, all of which will be subject to routine maintenance such that it is not considered to pose a significant risk to creating an accident or disaster.

3.11.4 The substation compound will have a concentration of electrical infrastructure which will include the substation and transformers all of which will be adopted by the DNO and subject to their routine maintenance regime. Accordingly, it is not considered to pose a significant risk of creating an accident or disaster.

3.11.5 Overall, no potential has been identified for the development proposal to lead to increased risk of a major accident or disaster in isolation or in combination with cumulative developments.

3.12 CLIMATE CHANGE

3.12.1 The ES should also include description of the likely significant effects the development proposal has on climate and the vulnerability of the project to climate change.

3.12.2 With regards to vulnerability to climate change, the solar modules are designed to capture the sun's energy and therefore built to withstand extreme climatic conditions and are purposefully located in open locations. The site is not located within a costal location and as such is not at risk to any changes to the sea level. The framework holding the modules are driven into the ground at an appropriate depth which responds to site specific ground conditions and are designed to accommodate the predicted relatively small change in wind speed during the lifespan of the development.

3.12.3 Turning to the proposal effects on climate change, the UK Government has set ambitious targets for reducing greenhouse gas emissions by 2050. The Development, in conjunction with other renewable energy developments, will contribute to the UK's aims to reduce carbon emissions and achieve its ambitious greenhouse gas emissions reduction targets. When operational, the Development will generate electricity from a renewable source and export this to the National Grid.

3.12.4 The solar park would generate renewable energy The proposal would provide a clean, renewable and sustainable form of electricity. It would make a valuable contribution to the generation of electricity at a local level. The scheme would add to the Council's progress in meeting its renewable energy target. It would also assist in meeting national targets. The generation of electricity from the Development will displace the generation of electricity from other conventional power sources, typically coal, oil or gas-fired electricity production as these are more often being decommissioned.

4 ALTERNATIVES

4.1 INTRODUCTION

4.1.1 The EIA Regulations (Schedule 4, paragraph 2) require for inclusion in an ES:

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

4.1.2 With regards to renewable energy, the principal methods of considering alternatives is through the site selection process and the establishment of a site which is both technically feasible and which minimises potential environmental impacts. Alternative energy generating solution is also a material consideration together with the 'do nothing' approach.

'Do Nothing' Alternative

4.1.3 The 'do nothing' option would entail leaving the development site in its current condition and it is assumed that the current land use would remain as it is, that is, available for agricultural use. It is an obvious statement that any impacts associated with the proposed development would therefore not occur. However, the 'do nothing' option will result in the loss of potential renewable energy source proposed by the development proposal. Other benefits that would not be secured are farm diversification and biodiversity enhancements.

Alternative processes

4.1.4 In terms of comparative alternatives when considering the agricultural land take, the production of energy from solar panels is far more efficient than alternative forms of energy production gained from cropping the land. Ground mounted solar schemes represent a prudent and efficient use of agricultural land in comparison to the energy output from biofuels. A 'land take' comparison of equivalent energy crop production is set out below[1]:-

Table 4.1: Energy Crop – MWh per acre per annum

Energy Source / Crop	MWh per acre per annum (approx. values)
Short rotation coppice	19 MWh per acre per annum
Miscanthus	26 MWh per acre per annum
Wheat Straw	5 MWh per acre per annum
Rapeseed oil diesel	5 MWh per acre per annum
Bioethanol (from sugar beet)	13 MWh per acre per annum

[1] Source – information adapted from http://www.biomassenergycentre.org.uk/portal/page?_pageid=75,163231&_dad=portal&_schema=PORTAL

Bioethanol (from wheat)	7 MWh per acre per annum
Ground Mounted arrays	186 MWh per acre per annum

4.1.5 As noted above, the ground mounted solar array scheme represents an efficient and effective use of land compared to other energy crops grown on agricultural land. Purely, therefore, in terms of the utilisation of natural resources, production of energy from solar panels is far more efficient than other forms of energy production from cropping the land. Wind could be harnessed within the site, however one or two large scale turbines would be necessary to generate the equivalent amount of export power and given the site context it is concluded that the preferred technology is ground mounted solar arrays.

4.1.6 The utilisation of solar panels also allows for sheep grazing to be retained on the Application Site.

Alternative Scales

4.1.7 The scale of the Proposed has been reduced from that submitted in the pre application request where it was initially envisaged that the site could accommodate an installed capacity of up to 12 MW.

4.1.8 Three parcels of land within the landowner's landholdings were initially considered considered. This preliminary appraisal included land further south of the Application Site land which would have been closer to residential properties within the settlement of Cwm-twrch Uchaf, including those on Heol Tre-dog. This parcel of land was subsequently discounted from the Application Site.

Alternative Designs

4.1.9 The constraints and opportunities presented by the Application Site have been used to inform the design principles, which in turn have helped refine and structure the Proposed Development.

4.1.10 A number of mitigation measures have ben implemented during the iterative design stage and these relate to the protection of boundary vegetation, location and alignment of access tracks, location of ancillary infrastructure such as substations and transformers and also the size and location of the construction compound.

4.1.11 Site specific requirements or modifications made to the design over the course of the design process as a result of technical consultants' feedback include:

- An appropriate buffer of 15m provided to Ancient Woodland adjacent to the Application Site. No infrastructure/panels would be located in this 15m buffer area. Any required fencing would be standard deer fencing with driven wooden poles which would not impact upon the woodland. The construction compound would not be located in the vicinity of this ancient woodland.
- Appropriate retention and set back from trees and hedgerows, including consideration of Root Protection Areas which led to modifications to the early designs. No tree groups or hedgerows will require complete removal in order for the proposed development to be implemented. The tree protection measures demonstrate the feasibility of the proposed development in relation to retained trees the proposed development is acceptable from an arboricultural perspective.

- Additional planting and hedgerows enhancements, particularly along the Application Site's northern boundary to respond to landscape and visual context**.**
- Further biodiversity enhancements including to the onsite grassland and the provision of bird and bat boxes.

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

5 LANDSCAPE AND VISUAL

5.1 INTRODUCTION

5.1.1 This chapter comprises a Landscape and Visual Impact Assessment (LVIA) and considers the likely effects of the Proposed Development upon:

- Landscape elements associated with the Application Site;
- Landscape character of the study area;
- Landscape designations within the study area; and
- Visual amenity of receptors associated with the study area.

5.1.2 The main objectives of the LVIA are:

- To describe the landscape character of the site and its surroundings, evaluate its sensitivity to change and, taking into account the magnitude of change, assess the effect that the proposal would have on the local landscape character;
- To identify potential visual receptors (i.e. people who would be able to see the development), evaluate their sensitivity to change and, taking into account the magnitude of change, assess the effect that the proposal would have on visual amenity; and
- To identify landscape elements associated with the site, evaluate their sensitivity to change and, taking into account the magnitude of change, assess the effect the proposals would have on landscape elements.
- To identify and integrate any mitigation measures that may help in offsetting or reducing adverse effects.
- To assess the residual effects upon the identified landscape and visual receptors.

5.2 ASSESSMENT APPROACH

Methodology

5.2.1 The following topics are discussed in the Methodology section:

- The study area;
- Guidance used in the assessment methodology;
- Consultation;
- Assessment of physical effects;
- Assessment of effects on landscape character;
- Assessment of effects on views;
- Assessment of cumulative effects;
- The nature of effects; and
- Graphic techniques.

5.2.2 The assessment considers the effect on the landscape resource (both direct effects and effects on how the landscape character is perceived) and the effect on visual amenity (views) in construction, operation and decommissioning. Cumulative effects, arising from the effect of the Proposed Development in conjunction with other solar farms are also considered.

Study Area

5.2.3 This assessment of the likely significant effects of the Proposed Development on the landscape and visual resource has taken account of all of the attributes of the landscape. In order to do this it has been necessary to identify a study area within which all of these effects will be contained. Based on experience in assessing such type of infrastructure and knowledge of the area a 5km study area was considered to be appropriate and proportionate for the purpose of this assessment. This is shown on Topography Plan (**Figure 5.1**).

Guidance

5.2.4 The methodology used in this assessment has been developed with regards to the following key guidance:

- Guidelines for Landscape and Visual Impact Assessment (2013). Third Edition, Landscape Institute and the Institute for Environmental Management and Assessment (GLVIA3);
- LANDMAP Methodology 2016 for each of the five layers.

5.2.5 GLVIA3 states within paragraph 1.1 that

> **"Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects 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."[1]**

5.2.6 GLVIA3 also states within paragraph 1.17 that when identifying landscape and visual effects there is a

> **"need for an approach that is in proportion to the scale of the project that is being assessed and the nature of the likely effects. Judgement needs to be exercised at all stages in terms of the scale of investigation that is appropriate and proportional."[2]**

5.2.7 GLVIA3 recognises within paragraph 2.23 that

> **"professional judgement is a very important part of LVIA. While there is some scope for quantitative measurement of some relatively objective matters much of the assessment must rely on qualitative judgements"[3]** undertaken by a landscape consultant or a Chartered Member of the Landscape Institute (CMLI).

5.2.8 Although a series of guidance documents on LANDMAP have been published it appears that there is no specific guidance that would deal with solar energy infrastructure in the context of the LANDMAP assessment.

5.2.9 The assessment is based on information from LANDMAP datasets available on Natural Resources Wales website:

[1] Para 1.1, Page 4, GLVIA, 3rd Edition

[2] Para 1.17, Page 9, GLVIA, 3rd Edition

[3] Para 2.23, Page 21, GLVIA, 3rd Edition

- Geological Landscape – 25/02/2019;
- Landscape Habitats – 06/03/2019;
- Visual and Sensory – 15/01/2019;
- Historic Landscape – 14/12/2018; and
- Cultural Landscape – 05/07/2018.

Consultation

5.2.10 Consultation has been carried out with PCC during the scoping stage with viewpoint selection proposed as part of the Scoping Report submitted to Powys Council on 6th June 2019 (Ref 19/0966/SC). The Scoping Opinion was received on 1st August 2019 with the Council requesting the assessment of additional views. These were not specifically identified but the areas of elevated landscape to the west and south were suggested by the Council. This is further explained in Section 5.4.

5.2.11 The viewpoint selection reflects the viewpoints selected for the neighbouring consented 20MW solar installation to the east to allow comparison and assessment of cumulative effects.

Assessment – General Comments

5.2.12 Solar farms tend to give rise to effects within the landscape by virtue of a number of attributes specific to both their individual form and to the location and grouping of solar arrays. These attributes include:

- Strong linear and repetitive form;
- Contrast with sinuous landscape pattern;
- Location (often within elevated landscape or south facing landform); and
- Relationship to the scale and nature of the existing landscape.

5.2.13 These attributes may affect different components of the landscape in different ways, or may combine to result in an effect. This assessment of the effects of the Proposed Development on the landscape does not consider the balance of public attitudes towards solar farms. The assessment concentrates instead on the change that the Proposed Development will bring to the different attributes of the landscape on the basis of the magnitude of that change and the sensitivity of the receptor, as assessed by qualified professionals.

5.2.14 The study area consists of a 5km radius (offset from the Application Site boundary), within which predicted effects on landscape receptors have been identified and assessed (both landscape designations and LANDMAP). The study area is not intended to provide a boundary beyond which the Proposed Development will not be seen, but rather to define the area within which to assess its potential significant landscape and visual effects. Significant landscape and visual effects are more likely to include effects on close proximity views, the change in character of the Application Site and the area in close proximity to it, as a result of a change in the landscape pattern or the perception of the solar farm.

5.2.15 Physical effects are restricted to the area within the Application Site and along the grid connection route. They consist of direct effects on the fabric of the Application Site, such as the removal of existing ground cover and landscape elements.

Susceptibility and Value – General Comments

5.2.16 Sensitivity is defined in GLVIA3 as

> **"...a term applied to specific receptors, combining judgments of susceptibility of the receptor to a specific type of change or development proposed and the value related to that receptor."[4]**

5.2.17 Sensitivity is determined by a combination of the value that is attached to a receptor (be it a landscape element, landscape character receptor or view) and the susceptibility of that receptor to changes that would arise as a result of the Proposed Development. Both value and susceptibility are assessed on a scale of high, medium or low. The criteria for assessing the value and susceptibility of landscape elements, landscape character receptors and visual receptors are set out later in this section.

5.2.18 Various factors in relation to the value and susceptibility of landscape elements, landscape character, visual receptors or representative viewpoints are described in the Detailed Methodology **Appendix 5.1** and are cross referenced to determine the overall sensitivity as shown in **Table 5.1.**

Table 5.1 Overall sensitivity of landscape and visual receptors

Term	**Description**			
	Value			
Susceptibility		High	Medium	Low
	High	High	High	Medium
	Medium	High	Medium	Medium
	Low	Medium	Medium	Low

Magnitude of Change– General Comments

5.2.19 Magnitude of change is defined in GLVIA3 as

> **"a term that combines judgements about the size and scale of the effect, the extent over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration."**[5]

5.2.20 Various factors contribute to the magnitude of change on landscape elements, landscape character, visual receptors and representative viewpoints as set out in **Appendix 5.1.**

Nature of Effects – General Comments

5.2.21 The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (as amended) requires that the description of the likely significant effects should cover the direct effects and any indirect, secondary,

[4] Glossary, Page 158, GLVIA, 3rd Edition

[5] Glossary, Page 158, GLVIA, 3rd Edition

cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development.

5.2.22 GLVIA3 includes an entry that states "*effects can be described as positive or negative (or in some cases neutral) in their consequences for views and visual amenity*." GLVIA3 does not, however, state how negative or positive effects should be assessed and this therefore becomes a matter of subjective judgement rather than reasoned criteria. Due to inconsistencies with the assessment of negative or positive effects a precautionary approach is applied to this LVIA that assumes all landscape and visual effects are considered to be negative or adverse unless otherwise stated.

5.2.23 The approach to this (and the interpretation of positive, negative or neutral effects) in the context of GLVIA3 and this LVIA is set out in detail in **Appendix 5.1.**

Assessment of Significance

5.2.24 The purpose of an LVIA when produced in the context of an EIA is to identify any significant effects on landscape and visual amenity arising from the proposed development.

5.2.25 The likely significance of effects is dependent on all of the factors considered in the sensitivity and the magnitude of change, upon the relevant landscape and visual receptors. These factors are assimilated to assess whether or not the Proposed Development will have a likely significant or not significant effect. The variables considered in the evaluation of the sensitivity and the magnitude of change is reviewed holistically to inform the professional judgement of significance.

5.2.26 The sensitivity of the landscape and visual receptor and the magnitude of change arising from the Proposed Development are cross referenced in **Table 5.2** to determine the overall degree and significance of landscape and visual effects. This corresponds with Diagram 5.1 in **Chapter 2: Assessment Scope and Methodology**.

Table 5.2: Significance Matrix

Magnitude of Change	**Sensitivity of Receptor**				
		High	**Medium**	**Low**	**Negligible**
	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor to Moderate	Negligible
	Low	Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

5.2.27 It is important to note that the matrix approve is intended to act as a guide to the assessment rather than a formulaic approach. The level (relative significance) of the landscape and visual effects is determined by combining judgements regarding sensitivity of the landscape or view, magnitude of change, duration of effect and the reversibility of the effect. in LVIA, any judgement about what

constitutes a significant effect is ostensibly a subjective opinion expressed as in this case by a competent and appropriately qualified professional assessor.

5.2.28 The level (relative significance) of effect is described as **Major, Moderate, Moderate/Minor, Minor, or Negligible.** No Effect may also be recorded as appropriate where there are no effects.

5.2.29 In the LVIA, those effects described as **Major, Major/Moderate** and **Moderate** may be regarded as significant effects as required by the EIA Regulations and a summary justification is provided as to whether the effect in question is significant or not significant. These are the effects which the authors of the LVIA consider to be most material in the decision making process. It should be noted that whilst an individual effect may be significant, it does not necessarily follow that the Proposed Development would be unacceptable in the planning balance.

5.2.30 In determining the level of residual effects, all mitigation measures are taken into account.

Significance of cumulative effects

5.2.31 As with the assessment of effects of the Proposed Development, the significance of cumulative effects is determined through a combination of the sensitivity of the landscape receptor or view and the magnitude of change upon it. The sensitivity of landscape receptors and views is the same in the cumulative assessment as in the assessment of the site itself. However, the definition of a significant cumulative effect is different from a significant effect in the assessment of the site itself, and this means that the magnitude of change is also assessed in a different way as described in **Appendix 5.1**.

Graphic Techniques

5.2.32 A number of guidance documents have been published that deal with site photography and photomontage techniques in general. Specific guidance in relation to wind farms has been available from the Scottish Natural Heritage since the early 2000s but there is lack of similar guidance for solar energy developments. In the absence of such guidance Pegasus has developed its own guidance with regard to the published documents.

5.2.33 The Photoviews and Photomontages were produced in the following way:

- The photograph locations were GPS recorded. These single photographs were then stitched together using *PTGui* to create a panoramic image of 75 degrees in planar projection.
- The details of the development were modelled in *3d Studio Max* from elevation and site layout plans provided by the client.
- The stitched photograph was then used as a backdrop within *3d Studio Max* at full resolution. Using the known photograph location and then picking out features on the photograph these where cross-referenced with the same points taken from a number of sources including aerial imagery, Mastermap base mapping and survey points to accurately create a camera with *3d Studio Max* and *Vray* to match the camera height, location and image field of view and resolution, a process known as camera matching. These 'survey' points are taken across the image both foreground and distant in order to allow for increased accuracy. Where necessary additional features were created as 3d models within *3d Studio Max* to allow for better alignment.

- Once the alignment was correct the completed 3d model was then rendered onto the photography to complete a seamless image.
- For the images produced as photomontages these were taken into *Photoshop* in order to apply the masking. Masking is where the foreground objects and features or features which may 'mask' the development within the original photography are redrawn in front of the rendered image in order to simulate how the development will look within the existing landscape.
- Once all the masking has been applied the image is then placed into the template within *InDesign* and the final pdf output is produced.

5.2.34 The precise location of each photograph is recorded using a hand-held GPS device and bearings from this location to prominent vertical features within the view (such as transmission masts) are also recorded using Google Earth software.

5.2.35 Computer modelling is used to assist in the assessment process and to illustrate the effects of the solar farm through the production of zone of theoretical visibility (ZTV). The ZTV illustrates the theoretical extent of where the development may be visible from, assuming 100% atmospheric visibility and includes the screening effect from vegetation and buildings, based on the following assumptions:

- Indicative woodland and building heights are modelled at 15m and 8m respectively;
- Viewer height set at 1.7m;
- Calculations include earth curvature and light refraction.

5.2.36 The ZTV has been generated using Digital Terrain Model of OS Terrain 5 combined with OS Open Map Local data for woodland and buildings to create a Digital Surface Model (DSM).

5.2.37 The ZTV provided in this Chapter illustrates the cumulative ZTV to show locations where the theoretical visibility of the neighbouring solar farm overlaps with the Proposed Development. In the cumulative ZTV separate colours have been used to illustrate the theoretical visibility of the Proposed Development, cumulative layouts and areas where they overlap.

5.2.38 Weather conditions and visibility were considered an important aspect of the site visits for the photography. Where possible, visits were planned around clear sunny days with good visibility. Viewpoint locations were then, where possible, visited according to the time of day and the orientation of the sun to avoid front lit scenes. Photographs facing into the sun were avoided where possible to prevent the silhouette effect. Adjustments to lighting were made in the rendering software to allow the turbines to appear realistic in the view under the particular lighting and atmospheric conditions present at that time. The Landscape Institute has produced Advice Note 01/11 Photography and photomontage in landscape and visual impact assessment, which provides further details. Photomontages have been produced for a number of the views, using 3d Studio Max. The Landscape Institute is currently working on a new guidance on visualisations but the report has not yet been formalised or adopted, therefore is not being used in this LVIA.

5.2.39 Whilst every effort has been made to ensure the accuracy of the photomontages, it must be appreciated that no photomontage could ever claim to be 100% accurate as there are a number of technical limitations in the model relating to the accuracy of information available from Ordnance Survey and from the GPS. For a detailed discussion regarding the limitations of photomontages, please refer to Visual Representation of Wind farms – Good Practice Guidance (SNH

commissioned report FO3 AA 308/2). The photographs and photomontages used in this assessment are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what will be apparent to the human eye. The assessments are carried out from observations in the field rather than from photographs.

Legislative and Policy Framework

5.2.40 A review of the planning and legislative context, as they relate to the landscape and visual effects of the Proposed Development has been carried out. The **Planning Statement** details the overall planning policy context. Those policies that are relevant in terms of landscape and visual issues are described in the following paragraphs.

National policy

Planning Policy Wales (PPW)

5.2.41 Planning Policy Wales (PPW, 10th Edition, December 2018) sets out the Welsh Government's overarching planning policies for land use and confirms the Government's commitment to maximise renewable energy generation at every scale across Wales. The Welsh Government recognises that the benefits of renewable energy are part of the overall commitment to tackle climate change. It establishes the Government's approach that:

> **"There should be a presumption in favour of development in identified areas, including an acceptance of landscape change, with clear criteria-based policies setting out detailed locational issues to be considered at the planning application stage." (para 5.9.8, p. 92).**
>
> **"Outside identified areas, planning applications for renewable and low carbon energy developments should be determined based on the merits of the individual proposal. (...) Planning authorities should seek to ensure their area's renewable and low carbon energy potential is achieved and have policies with the criteria against which planning applications outside of identified areas will be determined."**

5.2.42 PPW goes on to state:

> **"In circumstances where protected landscape, biodiversity and historical designations and buildings are considered in the decision making process, only the direct irreversible impacts on statutorily protected sites and buildings and their settings (where appropriate) should be considered." (para 5.9.17, p. 94).**

5.2.43 In accordance with PPW para 5.9.18, p. 94 and para 5.9.19, p. 95, this LVIA will assess how the potential effects have been avoided or minimised, it will also assess the impact on the natural environment, and cumulative impact of the Proposed Development.

5.2.44 PPW is explicit in addressing the issue of landscape character stating in para 6.0.2, p.123:

> **"The special and unique characteristics and intrinsic qualities of the natural and built environment must be protected in their own right, for historic, scenic, aesthetic and nature conservation reasons. These features give places their unique identity and distinctiveness and provide for cultural experiences and healthy lifestyles."**

5.2.45 The PPW also recognises the value of landscape stating:

> **"The countryside is a dynamic and multi-purpose resource. ... it must be conserved and, where possible, enhanced for the sake of its ecological, geological, physiographic, historical, archaeological, cultural and agricultural value and for its landscape and natural resources. The need to conserve these attributes should be balanced against the economic, social and recreational needs of local communities and visitors." para 3.34, p. 33.**

5.2.46 PPW goes on to say:

> **"Trees, woodlands, copses and hedgerows are of great importance for biodiversity. They are important connecting habitats for resilient ecological networks and make a valuable wider contribution to landscape character, sense of place, air quality, recreation and local climate moderation. They also play a vital role in tackling climate change by locking up carbon..." para 6.4.24, page 142.**

Technical Advice Note 8: Renewable Energy

5.2.47 Technical Advice Note 8: Renewable Energy was adopted in 2005 and provides the Welsh Government's a strategic advice with regard renewable energy schemes. In terms of solar energy schemes, it states:

> **"Other than in circumstances where visual impact is critically damaging to a listed building, ancient monument or a conservation area vista, proposals for appropriately designed solar thermal and PV systems should be supported." Para 3.15, page 11.**

Local policy

Powys County Council – Local Development Plan

5.2.48 The Powys Local Development Plan (2011-2026) was adopted in April 2018. The northern part of the study area falls within the Brecon Beacon National Park, and its development plan is discussed later in this section of the LVIA.

5.2.49 The Local Development Plan (LDP) recognises that:

> **"The landscape of Powys is extremely diverse and includes upland landscapes and valleys that are scenically and historically important. Development which impacts on the landscape must be carefully managed and appropriately designed particularly in terms of visual impact." (para 13, p. 20) This is reflected in the LDP Objective 13 - Landscape and the Historic Environment, i. Landscape: "To protect, preserve**

> **and/or enhance the distinctive landscapes of Powys and adjoining areas, including protected landscapes."**

5.2.50 The LDP provides a number of policies that, broadly speaking, protect and promote conservation and enhancement to the natural environment. Out of these the Development Management Policies DM2, DM4, and RE1 are the most relevant in the context of the Proposed Development and its location.

5.2.51 Policy DM2 – The Natural Environment, refers to landscape nature conservation areas such as Special Areas of Conservation, Sites of Special Scientific Interest, and National Biodiversity Action Plan Habitats and Species, and local nature reserves. It also refers to **"Trees, woodlands and hedgerows of significant public amenity, natural or cultural heritage"** and protection, positive management, and enhancement to the site, habitat or species.

5.2.52 The text that accompanies this policy refers to the visual amenity of trees, woodlands and hedgerows. It also states that development would not be permitted where an unacceptable harm to these features will occur (para 4.2.12, p. 52).

5.2.53 The Policy DM4 – Landscape is particularly relevant as it refers to the character and quality of Powys' landscape:

> **"Proposals for new development outside the Towns, Large Villages, Small Villages and Rural Settlements defined in the Settlement Hierarchy must not, individually or cumulatively, have an unacceptable adverse effect, on the valued characteristics and qualities of the Powys landscape. All proposals will need to:**
>
> **1. Be appropriate and sensitive in terms of integration, siting, scale and design to the characteristics and qualities of the landscape including its: topography; development pattern and features; historical and ecological qualities; open views; and tranquillity; and**
>
> **2. Have regard to LANDMAP, Registered Historic Landscapes, adjacent protected landscapes (National Parks and Areas of Outstanding Natural Beauty) and the visual amenity enjoyed by users of both Powys landscapes and adjoining areas.**
>
> **Proposals which are likely to have a significant impact on the landscape and/or visual amenity will require a Landscape and Visual Impact Assessment to be undertaken."**

5.2.54 In this context the proximity to the Brecon Beacons National Park is of particular relevance. The accompanying text refers to such factors associated with Powys' landscape as open panoramic views, strong sense of remoteness and tranquillity, topography, landscape pattern of woodlands, uplands, valleys, and field boundaries, amongst other factors, which make a place distinctive (para 4.2.28, p. 55). The text also refers to LANDMAP assessment and use of the relevant Guidance Notes on LANDMAP.

5.2.55 In the context of the Proposed Development, Policy RE1 – Renewable Energy states that solar energy schemes will be judged against policies in the LDP and are expected to provide mitigation measures to reduce the potential impacts and provide for restoration once decommissioned. It is worth mentioning that the

Application Site does not fall within the Council's identified Local Search Areas for solar energy developments.

5.2.56 According to the Policies Map, the Application Site falls within the Coal Resource Safeguarding Area covered by Policy SP7 and DM8. It appears that no other spatially specific policies cover the Application Site or abut its boundaries.

Powys County Council – Landscape Supplementary Planning Guidance

5.2.57 The Landscape SPG (adopted in April 2019) is a material consideration in the determination of the proposed Bryn Henllys solar farm.

5.2.58 The Landscape SPG provides a useful definition of landscape referring to

> **"...remoteness, tranquillity, shape, patterns, form, land uses, vernacular, textures and colours".**

5.2.59 The Landscape SPG also states that the character of the landscape is defined by its physiography and visual qualities (para 4.1, p. 4). With regard to landscape character assessment the SPG lists a number of published resources of which the most relevant are:

- LANDMAP;
- National Landscape Character Areas;
- Register of Landscapes of Historic Interest in Wales; and
- Powys Renewable Energy Assessment: Landscape Sensitivity Study for Solar Farm Development (ENPLAN May 2017).

5.2.60 In addition to the policies discussed above the SPG refers to other policies concerned with design and natural resources.

5.2.61 The Strategic Policy SP7 - Safeguarding of Strategic Resources and Assets states that development must not have unacceptable adverse impact on the resource or asset associated with Powys' landscape. This includes conservation area, registered historic landscapes, parks and gardens, other heritage assets but also recreational assets such as National Trails, Public Rights of Way, other promoted routes and National Cycle Network. The Policy also refers to **"...valued characteristics and qualities of the landscape throughout Powys..."** but stops short of defining these.

5.2.62 The Policy DM13 – Design and Resources required development's design to "... complement and/or enhance the character of the surrounding area in terms of siting, appearance, integration, scale, height, massing, and design detailing" and to contribute "...towards the preservation of local distinctiveness and sense of place..."

5.2.63 The SPG also provides advice on the use of LANDMAP and its layers, and explaining definitions associated with different evaluation criteria. It goes on further to list a number of key considerations that are relevant to the assessment of solar energy developments. These have been reviewed to help inform the assessment.

Powys County Council – Renewable Energy Supplementary Planning Guidance

5.2.64 The Renewable Energy SPG (adopted in April 2019) is a material consideration in the determination of the proposed Bryn Henllys solar farm. The SPG refers to the Policies RE1 – Renewable Energy, Strategic Policy SP7 – Safeguarding of Strategic

Resources and Assets, and Policy DM13 – Design and Resources discussed in the previous paragraphs.

5.2.65 The SPG refers to a Landscape Sensitivity and Capacity Assessment (LSCA) and LVIA as tools required to properly assess potential effects of proposed solar energy schemes in Powys. Most helpful is the reference to the Landscape Sensitivity Study for Solar Farm Development (LSS), commissioned from Enplan by the Council in February 2017.

Powys Renewable Energy Assessment: Landscape Sensitivity Study for Solar Farm Development

5.2.66 The Powys Renewable Energy Assessment: Landscape Sensitivity Study For Solar Farm Development was adopted in May 2017 and assesses the landscape sensitivity of Solar Local Search Areas (LSAs) across Powys. The published Study stemmed from the earlier high-level strategic assessment of the potential for different scales of renewable and low carbon energy generation, which was carried out utilising the method set out in Welsh Government's 'Planning for Renewable and Low Carbon Energy – A Toolkit for Planners' (September 2015). The identified LSAs comprise the least constrained land and it is shown that these are located in the central and northern part of the County and not within the study area.

5.2.67 It is however helpful in confirming the Council's approach to the assessment of such form of development, confirming their use of GLVIA 3rd Edition and methodology for the assessment of susceptibility and value. This is particularly useful in the context of the Proposed Development, as there is no such assessment for the landscape within the identified study area. This is discussed in detail later in the LVIA.

Scoping Criteria

5.2.68 In accordance with best practice, the assessment considers the following potential effects:

- Construction Phase – landscape elements within the Application Site;
- Construction Phase – effects on landscape character of the study area;
- Construction Phase – effects on visual receptors associated with the study area;
- Operational Phase – landscape elements within the Application Site;
- Operational Phase – effects on landscape character of the study area;
- Operational Phase – effects on visual receptors associated with the study area;
- Operational Phase – cumulative effects on landscape character of the study area;
- Operational Phase – cumulative effects on visual receptors associated with the study area; and
- Decommissioning Phase.

Limitations to the Assessment

5.2.69 Photography, for the selected viewpoints and to illustrate the site context, were taken from publicly accessible places and not private land.

5.2.70 The site visit was carried out in mid June when vegetation was in leaf thus providing some level of screening. Where necessary, and judged to be relevant the assessment, allowance is made for the anticipated 'winter' view.

5.3 BASELINE CONDITIONS

Site Description and Context

5.3.1 The Application Site can be described as two separate parcels compromising a number of pastoral fields currently used for grazing cattle and are connected by an access track and accessed from Heol Penygraig. The road crosses the valley of the River Twrch, west of the Application Site and leads through the settlement of Ystradowe, connecting with the A4068. The northern and southern parcels are separated both physically and visually by a belt of trees. The property known as Waun-lwyd is adjacent to the western boundary of the northern parcel and has views over this part of the Application Site.

5.3.2 The southern parcel comprises five fields and its field boundaries are defined by mature and established hedgerows with frequent hedgerow trees and appear to be in good condition. The height of the vegetation is considerable, creating a strong sense of enclosure. Due to the sloping topography views across the landscape to the south are easily obtainable but are limited to the higher ground and not the valley landscape. The identifiable landscape features include the distant Farteg Hill to the south-east with a characteristic line of electricity pylons, the elevated topography of Mynydd Allt-y-grug to the south with isolated farmsteads dotted on its northern slopes, and Mynydd Uchaf and open cast mine to the south west. Views to the east, north, and west are generally screened by field boundary vegetation.

5.3.3 The northern parcel consists of four fields, hedgerows are lower, neatly trimmed and gappy in places. This is particularly evident along the eastern edge of this parcel where the Application Site abuts a track and public footpath, which leads north-east towards the Brecon Beacon National Park. This part of the Application Site has a higher level of inter-visibility with the National Park, mostly to the north and north-west. To the north of the Application Site, two fields apart, is a belt of trees which broadly speaking marks the edge of the National Park. Tree vegetation continues to the west of the Application Site with trees covering the upper slopes of the valley of the River Twrch, largely restricting and screening views to the west. A water reservoir is located to the east of the northern parcel and sits slightly lower being enclosed by areas of woodland, which encloses this part of the hill and screen views to the east.

Baseline Survey Information

Sources of data

5.3.4 The baseline survey records the existing conditions of the Application Site and study area. This survey helps to gain an understanding of what makes the landscape distinctive, what its important components or characteristics are, and how it is changing prior to the introduction of the Proposed Development. The baseline survey is instrumental in the identification of the landscape character receptors and visual receptors/views to be included in the assessment. The baseline study is presented in three sections:

- Landscape character;
- Landscape designations; and
- Visual receptors and views.

Landscape Character Assessment

5.3.5 The Powys Landscape Character Assessment dated March 2008 and prepared by John Campion Associated Ltd is not listed as a resource in the current Powys County Council – Landscape Supplementary Planning Guidance (April 2019). Instead it refers to:

- National Landscape Character Areas;
- LANDMAP;
- Register of Landscapes of Historic Interest in Wales; and
- Powys Renewable Energy Assessment: Landscape Sensitivity Study for Solar Farm Development (ENPLAN May 2017).

5.3.6 These published reports are reviewed in turn, in the paragraphs below.

National Landscape Character Areas (NLCAs) for Wales

5.3.7 The National Landscape Character Areas for Wales represent a strategic approach to landscape character assessment. The Application Site, and much of the study area, falls within the NLCA 37 South Wales Valleys. The northern part of the study area coincides with the Brecon Beacon National Park and the associated NLCA 30 Brecon Beacons and Black Mountains. Due to their broad brush assessment these two NLCAs have not been included in this chapter and the assessment focuses on the local level landscape character descriptions. The description of both of these NLCAs, however, have been used to inform the assessment and allow for comparison with LANDMAP descriptions.

LANDMAP

5.3.8 Landscape character is assessed against information contained within LANDMAP which represents a different approach to landscape character and should not be regarded as a local level assessment. LANDMAP is Wales' own unique landscape character assessment developed by the [then] Countryside Council for Wales (CCW), and now under the Natural Resources Wales. It allows information about landscape to be gathered, organised and evaluated into a nationally consistent dataset. LANDMAP information is collected in a structured and rigorous way that aims to be as objective as possible and a Quality Assurance process is in place to assess all data collected. This GIS based landscape resource is organised in a hierarchical system that separates different aspects of landscape into geology, biodiversity, visual and sensory, history and archaeology and culture. The assessment allows to describe the landscape at different levels of accuracy:

- Geological Landscape: "Identifies those landscape qualities which are linked to the control or influence exerted by bedrock, surface processes, landforms and hydrology";
- Landscape Habitats: "Focuses on recording habitat features, characteristics and their spatial relationships within the context of the wider landscape";
- Visual & Sensory: "Maps landscape characteristics and qualities as perceived through our senses, primarily visually....The physical attributes of landform and land cover, their visible patterns and their interrelationship";
- Historic Landscape: identifies "Landscape characteristics that depend on key historic land uses, patterns and features. Identifies only those classes of historic land uses, patterns and features that are prominent and contribute to the overall historic character of the present landscape";

- Cultural Landscape: "Describes the links between landscape and people, from the way in which cultural, or human activity shapes the landscape, to the way in which culture shapes the way we respond to landscape."

5.3.9 LANDMAP also includes evaluation scores which are defined as follows:

- Outstanding evaluation – nationally important;
- High evaluation – regional or county importance;
- Moderate evaluation – local importance; and
- Low evaluation – little or no importance.

LANDMAP – Application Site

5.3.10 **Table 5.3** lists all LANDMAP Layers, relevant Aspect Areas and their Overall Evaluation, that cover the Application Site.

Table 5.3: LANDMAP Aspect Areas within the Application Site

LANDMAP Layer	Aspect Area Number	Aspect Area Name	Overall Evaluation
Geological Landscape	BRCKNGL773	Cefn Maw	High
Landscape Habitats	BRCKNLH101	Ystradowen	Low
Landscape Habitats	BRCKNLH456 A small part of the Application Site falls within this particular LANDMAP Aspect Area.	Swansea Valley – Ystradgynlais	High
Visual & Sensory	BRCKNVS365	Bryn Henllys Open Cast	Low
Historic Landscape	BRCKNHL753	Bryn-henllys	Low
Cultural Landscape	BRCKNCL847	Brecon Beacons National Park	Outstanding

5.3.11 With regards to the Landscape Habitats Layer the Application Site falls within two Aspect Areas. The majority of the Application Site is characterised by BRCKNLH101 with a very minor part falling within the BRCKNLH456 Aspect Area. This particular area contributes very little to the overall land cover of the Application Ste and the actual solar panels (the main component of the Proposed Development) would not be located within this particular area. For this reason, this Aspect Area has been excluded from further assessment.

LANDMAP – Study Area

5.3.12 With regard to the study area, the LANDMAP Aspect Areas for all five layers have been mapped as separate plans (**Figures 5.2 – 5.6**) and reviewed in order to establish those that are relevant and may be subject to potentially significant effects. The guidance available on Natural Resources Wales' website does not specifically advise on how to assess solar energy scheme in the context of LANDMAP aspect areas. It was therefore necessary to devise a transparent and coherent system to allow for such assessment. The process and principles established in the LANDMAP Guidance Note 3 have been used as a starting point,

taking into account the different type, scale, and nature of infrastructure (being devised for onshore wind turbines).

5.3.13 This scoping process[6] is a fundamental part of this assessment and allows for the short listing of those areas that are relevant for the purpose of this assessment. The initial step is to identify:

- Whether the aspect area is wholly / partially within the Application Site or is adjacent to it;
- The Proposed Development is visible from the aspect area (this step has been carried out at different stages of the scoping process as per LANDMAP Guidance Note 3);
- Geological Landscape: shortlist those aspect areas with an outstanding or high overall evaluation and/or outstanding or high rarity/uniqueness score;
- Landscape Habitats: shortlist those aspect areas with an outstanding or high overall evaluation and/or outstanding or high connectivity/cohesion evaluation score;
- Visual & Sensory layer: shortlist those aspect areas with an outstanding or high overall evaluation and/or quality evaluation and/or character evaluation score. In case where aspect areas score moderate or low, their potential for key visual receptors has been taken into account to determine whether aspect area should be taken forward for further assessment;
- Historic Landscape: shortlist those aspect areas with an outstanding or high overall evaluation;
- Cultural Landscape: shortlist those aspect areas with an outstanding or high overall evaluation and/or rarity evaluation and/or group value evaluation score; and
- Analysis of the baseline resource against Collector Survey data.

5.3.14 The steps outlined above allow to establish which aspect areas are potentially affected by the Proposed Development and whether they should be taken forward for further assessment. **Table 5.4** below lists all aspect areas taken forward for the final assessment.

5.3.15 In order to establish which aspect areas fall within the defined 5km study area five plans (**Figures 5.2 – 5.6**) were prepared to illustrate the geographical arrangement, overall evaluation of aspect areas and compared against the ZTV (**Figure 5.7**) to aid the scoping process.

5.3.16 The nature of the scoping process suggested by the LANDMAP Guidance Note 3 means that the baseline condition is included later during the scoping process and the scoping process is in fact an initial assessment.

Table 5.4 Summary of potentially affected aspect areas (as identified at the 'baseline condition' stage)

Geological Aspect Areas	
BRCKNGL447	Tyle Garw
BRCKNGL670	Ystradgynlais
BRCKNGL773	Cefn Maw

[6] Referred to in this context in respect to LANDMAP aspect areas, not to be confused with the EIA scoping process as described in Chapter 2.

BRCKNGL955	Carreg Goch
CRMRTGL272	Esgair Hir - Garreg Lag (1)
CRMRTGL292	Afon Twrch
CRMRTGL296	Foel Deg - Drysgol - Mynydd Isaf
CRMRTGL300	Tair Carn - Cefn Carn Fadog
NPTGL010	Upper Clydach Valley
Landscape Habitats Aspect Areas	
BRCKNLH456	Swansea Valley - Ystradgynlais
BRCKNLH479	Fan Brycheiniog
BRCKNLH693	Llorfa - Cefn Mawr
BRCKNLH777	Tyle Garw
BRCKNLH975	Mynydd y Drum - Twyn Eithinog
CRMRTLH029	Mynydd Du
CRMRTLH039	Carmarthen Coalfield
NPTLH001	Name not given
NPTLH003	Name not given
NPTLH013	Name not given
NPTLH077	Name not given
Visual & Sensory Aspect Areas	
BRCKNVS007	Twyn Eithiniog
BRCKNVS118	Dorwen ar Gledd
BRCKNVS365	Bryn Henllys Open Cast
BRCKNVS436	Tawe Valley and Cwm Twrch
CRMRTVS005	Ystradowen and Cefn-bryn-brain
CRMRTVS008	Black Mountain south eastern fringes
CRMRTVS016	The Black Mountain
CRMRTVS576	Black Mountain southern slopes
NPTVS149	Cwm Aman
NPTVS188	Mynydd Uchaf / Mynydd Garth
NPTVS344	Cwm Twrch
NPTVS541	Cefn Gwrhyd - enclosured
NPTVS581	Mynydd Allt Y Grug & Varteg Hill
Historic Landscape Aspect Areas	
BRCKNHL248	Hendre-ladis
BRCKNHL595	Mynydd Du
BRCKNHL735	Dyffryn Tawe
BRCKNHL753	Bryn-henllys

CRMRTHL39589	Twynmynydd, Brynpedol
CRMRTHL39600	Waun-Gron, Cefn-Bryn-Brain
CRMRTHL39601	Ty-Gwyn
CRMRTHL39602	Ynys Tre-Deg, Dorwen
CRMRTHL40293	Banc Wernwgan-Foel Fraith Quarries
CRMRTHL40294	The Black Mountain-Y Mynydd Ddu
NPTHL028	Mynydd Marchywel
NPTHL029	Mynydd Uchaf (Mynydd y Garth)
NPTHL040	Bryncoch Cilybebyll
NPTHL041	Clydach Cwm Du
Cultural Landscape Aspect Areas	
BRCKNCL501	Waterfall Country
BRCKNCL847	Brecon Beacons National Park
BRCKNCL957	Black Mountain Mynydd Myddfai
BRCKNCL965	Ystradgynlais
CRMRTCL586	Mynydd Myddfai and Black Mountains
NPTCL037	Banwen, Dyffryn Cellwen, Seven Sisters
NPTCL039	Pontardawe, Trebanos, Ynysmeudwy and God
NPTCL042	Ystalyfera
NPTCL043	Gwaun-cau-Gurwen, Tairgwaith, Cwmgors, L
NPTCL044	Western High Ridge: Mynydd y Garth, Cefn
NPTCL045	West Central High Ridge: Mynydd Marchywe

Landscape Designations

5.3.17 Various nationally and regionally designated areas and features are found in the wider study area and have been considered to some extent in the assessment. All environmental designations are depicted in Designations, Policies and Visual Receptors Plan (**Figure 5.7)**. There are three ways in which such designations are relevant to the assessment:

- The presence of a designation can give an indication of a recognised value that may increase the sensitivity of a landscape character receptor or viewpoint, and may therefore affect the significance of the effect on that receptor or viewpoint;
- The presence of a relevant designation can lead to the selection of a viewpoint within the designated area, as the viewpoint will provide a representative outlook from that area; and
- Designated areas may be included as landscape receptors so that the effects of the Proposed Development on these features of the landscape that have been accorded particular value can be specifically assessed.

5.3.18 In landscape character terms the Brecon Beacon National park is the only such receptor and the only statutory landscape designation in the study area. Other identified areas such as Ancient Woodlands, Areas of Open Access Land etc have

been used to help inform the visual assessment and are discussed later in this LVIA.

Brecon Beacons National Park

5.3.19 The Brecon Beacons National Park is located approximately 0.1 km from the north eastern most corner of the Application Site at its nearest point. Geographically, the National Park covers the upland and elevated landscapes in the northern and eastern parts of the study area. The Brecon Beacon National Park is a planning authority in its own right with planning policies and guidance documents providing information with regards to landscape and visual effects. The statutory duty of Brecon Beacons National Park authority are, in accordance with statutory purposes as defined in the Environment Act 1995, to conserve and enhance the natural beauty, wildlife and cultural heritage of the National Park and to promote opportunities for public enjoyment and understanding of special qualities of the National Park. This has to be balanced by its duty to foster the economic and social well-being of communities living within the National Park.

5.3.20 The Brecon Beacons National Park Authority Local Development Plan 2007-2022 is the current Development Plan and its policies have been reviewed to inform the landscape character assessment and selection of visual receptors. The Landscape and Development Supplementary Planning Guidance (Brecon Beacons National Park Authority, June 2014) is concerned with the development within the National Park itself. It does not provide any advice in terms of views in and out of the National Park or development around the National Park. The Brecon Beacons National Park Authority has also published its own Landscape Character Assessment (August 2012), which provides more succinct assessment than that of LANDMAP and includes management guidelines. Where relevant the information from this published report have been used and referenced in this LVIA.

5.3.21 'A Management Plan for the Brecon Beacons National Park 2015-2020' describes the area as

> **"...a diverse landscape, where sweeping uplands contrast with green valleys, dramatic waterfalls, ancient woodland, archaeological sites, caves, forests, reservoirs and vibrant communities." (para 1.2 / 6, page 7).**

5.3.22 The Management Plan in para 1.9 provides a list of special qualities of the National Park which are:

- **"A feeling of vitality and healthfulness that comes from enjoying the Park's fresh air, clean water, rural setting, open land and locally produced foods.**
- **A sense of place and cultural identity - "Welshness" - characterised by the use of the indigenous Welsh language, religious and spiritual connections, unique customs and events, traditional foods and crafts, relatively unspoilt historic towns, villages and family farms. The continued practices of traditional skills developed by local inhabitants to live and earn a living here, such as common land practices and grazing.**
- **A sense of discovery where people are able to explore the Park's hidden secrets and stories such as genealogical histories, prehistoric ritual sites, medieval rural settlements, early industrial sites, local myths, legends and geological treasures.**

- **The Park's sweeping grandeur and outstanding natural beauty observed across a variety of harmoniously connected landscapes, including marvellous gorges and waterfalls, classic karst geology with caves and sink holes, contrasting glacial landforms such as cliffs and broad valleys carved from old red sandstone and prominent hilltops with extensive views in all directions.**
- **A working, living "patchwork" of contrasting patterns, colours, and textures comprising of well-maintained farmed landscapes, open uplands, lakes and meandering rivers punctuated by small-scale woodlands, country lanes, hedgerows, stone walls and scattered settlements.**
- **Extensive and widespread access to the Park's diversity of wildlife and richness of semi-natural habitats, such as native woodlands, heathland and grassland, natural lakes and riparian habitats, ancient hedgerows, limestone pavement and blanket bogs including those of international and national importance.**
- **In the context of the UK, geographically rugged, remote and challenging landscapes.**
- **Enjoyable and accessible countryside with extensive, widespread and varied opportunities to pursue walking, cycling, fishing, water-based activities and other forms of sustainable recreation or relaxation.**
- **An intimate sense of community where small, pastoral towns and villages are comparatively safe, friendly, welcoming and retain a spirit of cooperation."**

Visual Receptors

5.3.23 There are a number of visual receptors, consisting of settlements, routes and features/attractions in the study area that require consideration in the assessment, as views from them may be affected by the Proposed Development. In order to focus on those receptors that may be potentially affected to a significant degree a so entitled screened ZTV (SZTV) has been overlaid onto the OS 1:25,000 Explorer map.

5.3.24 There are numerous route corridors traversing the study area, many of which are associated with urban development, while others provide access to the wider countryside. It is not possible or necessary to assess the potential effects of the Proposed Development on every route, however some of the key routes require consideration in the assessment. Three principal criteria have been considered in determining the inclusion of routes in the assessment: firstly, the extent to which the route traverses the study area or extends across a notable part of it, rather than including just a short stretch; secondly, the importance of the route in terms of recognition, signage, traffic volume and usage; and thirdly, the extent of visibility of the Proposed Development from the route.

5.3.25 All of the identified and relevant visual receptors have been reviewed and were subject to a scoping process. This shortlisting process allowed to focus on those specific visual receptors that are likely to experience significant or potentially significant effects. The baseline condition of these visual receptors is described below.

Settlements

5.3.26 The screened ZTV indicates that none of the settlements that line the low lying valleys are covered by the theoretical visibility of the Proposed Development.

These settlements that are free from or have a very limited theoretical inter-visibility with the Proposed Development include Brynamman on the edge of the 5km study area, Cwmllynell and Cwm-twrch Uchaf to the west and south of the Application Site, and more distant Gurnow and Ystradgynlais both located over 2km to the south east.

5.3.27 Some smaller areas of residential developments that are located on a higher ground may, in theory, gain some views towards the Application Site. Of these only parts of Ystradowen and Cwmllynell were considered relevant. These two areas are assessed in detail later in this chapter. In terms of its location and characteristics Ystradowen is a relatively small cluster of dwellings, largely concentrated along the A4068 and Heol Penygraig.

Residential Properties

5.3.28 With regards to isolated residential dwellings the majority of these fall outside of the screened ZTV, being located in low lying areas or screened by the intervening vegetation, or are relatively distant. Immediately to the south and west of the Application Site, there are clusters of properties located on the upper slopes and higher ground in a relatively close proximity and may theoretically gain some views of the Proposed Development:

- Waun-lwyd, which is adjacent to the northern part of the Application Site;
- Bryn-moel, Tredeg Farm, and Llys-y-Ddraig Goch located to the south; and
- Dan-yr-Allt, Ynys-y-Bont, Craig-Hopkin on the western side of the River Twrch.

Route corridors

5.3.29 None of the major public highways have been identified as subject to potentially significant effects. The A4067 and A4068 follow the low lying valley bottoms and fall outside of the screened ZTV. Similarly, minor or local roads that link various settlements or isolated properties are either screened or low lying, and thus do not offer views towards the Proposed Development. The screened ZTV plan indicates that some isolated highways in the north western part of the study area, are covered by the theoretical visibility. These routes, however, are relatively distant falling on the edge of the 5 km study area within the upland landscape of the National Park. At such distance the visibility and appreciation of the Proposed Development would be limited and visual effects are unlikely to be significant.

Cycle Routes

5.3.30 It appears that there are two SUSTRANS cycle routes, which in parts utilise disused railway lines: No. 43 in the southern and eastern part of the study area following the valley of the River Tawe, with No. 437 traversing the western part and broadly speaking following the valley of the River Aman. Based on the extent of the screened ZTV it is evident that only a relatively short section of the route No. 437, between Rhosaman and Cwmllynell, is subject to the theoretical visibility. The vegetative screening along the route and on the upper slopes around the Application Ste, however, prevent from gaining any direct and prolonged views. The site visit confirmed that views are either screened or considerably restricted and potential visual effects are unlikely to be significant.

Public Rights of Way / Open Access Lane / Registered Common

5.3.31 The network of Public Rights of Way (PRoWs) is frequent across the valley landscape but does not form a one particular pattern that would be evident in the

landscape. The upland areas are generally covered by extensive areas of Open Access Land, which are mapped on the OS Explorer map. These also occur in the south western part of the study area around the settlement of Gwaun-Cae-Gurwen, Mynydd Uchaf and Mynydd Allt-y-Grug, and the higher ground of Farteg Hill, Twyn Eithinog and Mynydd-y-Drumand in the south eastern and eastern parts.

5.3.32 With regards to PRoWs, those that are adjacent to the Application Site and the immediate area around it have been assessed in detail. More distant PRoWs have been visited and assessed in the round with the viewpoint selection reflecting the locations of these routes. It was judged that the selected viewpoints and visual receptors in conjunction with LANDMAP aspect areas will provide sufficient information for the purpose of this Environmental Statement and a separate assessment of the Open Countryside, Public Forests and Commons was not carried out.

Cadw / ICOMOS Register of Parks and Gardens of Special Historic Interest in Wales

5.3.33 The review of desktop mapping and dataset has not revealed any designed landscapes that would fall within the 5km study area. The closest such feature is the Black Mountain and Mynydd Myddfai historic landscape, located just over 5km to the north of the Application Site. The closest registered park/garden is Craig-y-Nos Castle and Country Park located approx. 8km to the north-east.

Viewpoints

5.3.34 The viewpoint selection has been guided by the landscape and visual impact assessment carried out for the neighbouring solar energy scheme (planning application ref. no. 15/11940). The review of the photographic evidence has suggested that these viewpoints are suitable for the purpose of this LVIA. This approach also allows for cumulative assessment and comparison of landscape change. One of the viewpoints for the neighbouring solar energy scheme, however, falls outside the screened ZTV of the Proposed Development and hence was omitted. It was considered that the viewpoint selection for the for the neighbouring solar energy scheme was lacking views from the north east, particularly at the interface of the Brecon Beacon National Park. This was rectified by adding a single viewpoint in relatively close proximity allowing for les restricted views into the Application Site (**Table 5.5**). The selected viewpoints have been judged to be appropriate and proportionate for the purpose of this LVIA, and in accordance with the GLVIA3.

5.3.35 Additional locations have been investigated in the western and southern part of the study area. This reflects the Council's request outlined in their Scoping Opinion issued 1st of August 2019. The Council has not specifically referred to any particular viewpoints or locations but instead stated:

"The LVIA should consider the Brecon Beacons National Park Management Plan and include further viewpoints as follows;

- **Viewpoints to the west within the National Park including from footpaths and access land**
- **Viewpoints from high ground to the south looking towards the National Park."**

5.3.36 A desktop based analysis has been carried out including aerial images and OS maps at various scales. This is addressed in the visual assessment section of this chapter.

Table 5.5 Selected Viewpoints

Vp number	Name
Viewpoint 1	View from public footpath, Brecon Beacons National Park, north-east of Application Site.
Viewpoint 2	View from northern end of Mynydd Allt-y-grug, south of Application Site.
Viewpoint 3	Open Access Land west of Pen-Rhiw-fawr on Gwrhyd Road, south-west of Application Site.
Viewpoint 4	Coedffaldau north-west of Pen Rhiw Fawr, south-west of Application Site.
Viewpoint 5	Bryn Road in Open Access Land, south of Cwnllynfell, west of Application Site.
Viewpoint 6	Open Access Land on Twyn-y-Moch, Brecon Beacons National Park, north-west of Application Site.
Viewpoint 7	Public footpath at Waun-y-Ddraenen / Open Access Land, Brecon Beacons National Park, north of Application Site.
Viewpoint 8	Bridleway / Open Access Land on Derlwyn Isaf, Brecon Beacons National Park, north of Application Site.
Viewpoint 9	Public footpath / Open Access Land, western upper valley slopes of the River Twrch, north of Application Site.
Viewpoint 10	Public footpath / Open Access Land on southern edge of Twyn Eithinog, south-east of Application Site.

5.3.37 The viewpoint assessment is used to inform and illustrate the assessment of effects on LANDMAP aspect areas (landscape character) and the assessment of effects on views. An initial viewpoint assessment and potentially significant effects on viewpoints are assessed in detail in this chapter. The relevant information is extrapolated in the assessment of effects on LANDMAP aspect areas and the assessment of effects on views.

5.4 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

5.4.1 Potential effects are those which could result from the construction, operation and decommissioning of the Proposed Development, according to the project, site and receptor characteristics and their interactions. The inclusion of a viewpoint in **Table 5.5** does not imply that predicted effects will occur, or will be significant for the Proposed Development. A variety of landscape and visual mitigation measures have been incorporated through the iterative design process in order to prevent, reduce or offset potential landscape and visual effects. Residual effects of the Proposed Development – those effects remaining after mitigation are also assessed in this Chapter. The below table identifies the elements of the Proposed Development, potential change, and potentially affected receptors as a guide for the detailed assessment (**Table 5.6**).

Table 5.6 Potential effects during construction, operation and decommissioning

Activity	Element	Potential Effect	Potential Sensitive Receptors
Construction	Construction plant. Temporary construction facilities.	Temporary physical effects on landscape elements. Temporary effects on landscape character - LANDMAP. Temporary effects on views. Temporary cumulative effects.	Physical landscape features, e.g., trees, hedgerows, ground cover. Landscape character receptors – LANDMAP, designated landscapes. Views – experienced by different receptors e.g. residents, road users, walkers.
Operation	Solar arrays, fencing and ancillary facilities.	Long term effects on landscape character - LANDMAP. Long term effects on views. Long term cumulative effects.	Physical landscape features, e.g., trees, hedgerows, ground cover. Landscape character receptors – LANDMAP, designated landscapes. Views – experienced by different receptors e.g. residents, road users, walkers.
Decommissioning	Construction plant. Temporary construction facilities.	Temporary physical effects on landscape elements. Temporary effects on landscape character - LANDMAP. Temporary effects on views. Temporary cumulative effects.	Physical landscape features, e.g., trees, hedgerows, ground cover. Landscape character receptors – LANDMAP, designated landscapes. Views – experienced by different receptors e.g. residents, road users, walkers.

5.4.2 The effects of the Proposed Development on the landscape and visual resource will arise principally from the construction, operation and decommissioning of the solar panels, access tracks, hardstandings, transformers, switchgear substations and AC Boxes. The temporary construction facilities, construction vehicles, construction compound and delivery vehicles required during the construction of the Proposed Development will have effects on the landscape and visual resource. The construction effects assessed in this section are predicted to end at the start of the operational stage. It is anticipated that the Proposed Development will be in operation for approximately 40 years. On completion of its operational life the site will be decommissioned and the site, except access tracks will return to its previous character. All adverse landscape and visual effects will therefore reverse to the previous state with the mitigation planting remaining as a permanent element and enhancing the landscape character.

5.4.3 The construction, operation and decommissioning of the Proposed Development may affect the landscape and visual resource in four ways:

- the physical effect on the fabric of the Application Site;
- the effect on the landscape character of the Application Site and study area;
- the effect on views from throughout the study area; and
- the cumulative effects that may arise from the addition of the Proposed Development and other solar farms in the area.

5.4.4 The physical effects of the Proposed Development may occur during the construction and decommissioning stages, but can have longer term effects, and will be restricted to the area within the Application Site. They are the direct effects on the fabric of the site, such as the removal of trees, hedgerows and alteration to ground cover that may take place during the construction of the proposed development.

5.4.5 Effects on landscape character will arise either through the introduction of new elements during the construction and operational stage, that alter the distinct and recognisable pattern of elements in a particular type of landscape, or through visibility of the Proposed Development, which may alter the way in which the pattern of elements is perceived. This category of effects considered effects on LANDMAP and designated areas.

5.4.6 Effects on views are the changes to specific views and visual receptors that will result during the construction, operation and decommissioning of the Proposed Development. The assessment of effects on views (of the various stages of the Proposed Development) is carried out through an assessment of visual receptors, e.g. settlements, route corridors and visitor attractions, and at a series of viewpoints that are selected to represent the outlook towards the proposed development from around the study area, at a range of distances and from various directions.

5.4.7 Cumulative effects arise as a result of more than one development being under construction, operation or decommissioning, giving rise to combined effects, so that both developments are experienced at proximity where they may have a greater incremental effect. A cumulative assessment will be carried out as part of in order that the potential for any such effects is identified, and their significance assessed.

Scheme layout response to potentially significant effects

5.4.8 As a consequence of the EIA process there have been a number of modifications to the scheme design to avoid and minimise landscape and visual impact. More information on scheme design is contained in Chapters 3 and 4 of this ES. The key landscape and visual considerations were:

- Relationship to and conservation of designated landscapes, historic assets and associated viewpoints; and
- Relationship to landscape character in particular to topography and scale;

Response to landscape character (topography and scale)

5.4.9 The Application Site is located on relatively elevated ground, exhibiting the same landscape characteristics to the neighbouring consented solar energy scheme. The Proposed Development has been designed around the retained boundary vegetation to retain and protect its function as a strong landscape framework, both in terms of wider green infrastructure and landscape character. During the iterative design stage the layout has been adjusted to allow for Root Protection Zone around the retained tree and hedgerow vegetation.

Response to designated landscape and viewpoints/views

5.4.10 The retained vegetation provides a considerable amount of screening, particularly in terms of close to medium range views. The more distant locations, within the upland landscapes, are more elevated and overlook the Application Site theoretically offering views of the Proposed Development. In reality, however, the level of inter-visibility is generally limited. Views from such locations are

increasingly distant and expansive encompassing wide panoramas of a large scale landscape. The additional mitigation planting around the northern parcel of the Application Site would help to limit the inter-visibility and would be more successful in limiting views from the edge of the Brecon Beacons National Park. This mitigation planting would include a new belt of trees along the northern boundary and additional planting along the eastern boundary to reinforce the existing hedgerow.

5.4.11 Views from the higher ground in the southern part of the study area have been used to inform the development of mitigation planting around the southern parcels of the Proposed Development. To avoid shading, however, the mitigation planting would take the form of a boundary hedgerow to provide for a robust field pattern and separation from the adjacent sloping ground. The anticipated screening provided by these mitigation measures is detailed in the visual assessment, where relevant.

Construction

5.4.12 The construction of the Proposed Development would be undertaken at the same time as the approved and adjacent Bryn Henllys solar farm. The temporary construction compound would be located within the approved / adjacent Bryn Henylls site, with materials transferred within Bryn Henllys and across to the Application Site. The same construction access will also be used for the Proposed Development, with secondary accesses and internal routes provided as appropriate. The construction period for the two solar farm proposals is expected to last approximately 45 weeks and will include the following activities, in the anticipated order (some of the work may be carried out concurrently):

- Vehicle and plant movements within the Application Site;
- Clearance and set up for temporary construction compound;
- Installation of fencing and CCTV cameras;
- Construction and upgrade of access tracks;
- Laying of connecting cables for solar strings;
- Work on grid connection and excavations for underground cables;
- Installation of switchgear substations, transformers, AC boxes and other ancillary facilities;
- Installation of metal frames and solar panels;
- Commissioning;
- Reinstatement works; and
- Landscape planting.

5.4.13 The location and management of these elements has been carefully considered to minimise the landscape and visual effects. At this stage it is predicted that the construction phase and delivery of aforementioned components will not require any off-site works that would be relevant from a landscape/visual point of view.

5.4.14 Ground disturbance within the Application Site would be restricted as far as practicable to some of the construction activities and elements. The proposed solar panels would be pile driven into the ground thus direct effects on the ground contours would be limited, reversible and not considered to be significant.

5.4.15 The location of the temporary construction compound would be located within the approved and adjacent Bryn Henylls site, with materials transferred within Bryn Henllys and the Application Site.

5.4.16 Measures that have been taken to mitigate the effects on landscape and visual resource during construction would include:

- Design to minimise vegetation removal (see **Appendix 5.2**);
- Control of construction night lighting to minimise effects on sensitive views;
- Maintenance of construction compound;
- Design to minimise land take; and
- Spreading of topsoil and reseeding and planting as soon as sections of work are complete.

5.4.17 Professional judgment has been used to establish the potential level of visibility of all elements, including movement of plant and erecting the individual elements of the Proposed Development, and the significance of their impact, as detailed below.

Potential Effects on Landscape Elements

5.4.18 Physical effects are found only within the Application Site, where existing landscape elements may be removed, altered or added by the Proposed Development. As stated previously the Application Site falls within two aspect areas associated with the LANDMAP Landscape Habitats layer: BRCKNLH101 Ystradowen of low overall evaluation and BRCKNLH456 Swansea Valley – Ystradgynlaisnof high overall evaluation. However, for the purpose of this LVIA the sensitivity of these grassland habitats, is taken as low. This is on the basis that such type of vegetation is of low value being frequent and occurring within the surrounding landscape. Such vegetation is considered to be of low susceptibility to changes arising from the Proposed Development and reflects the time needed to establish such type of vegetation.

5.4.19 The principal physical effect of the Proposed Development would be on the grassland associated with the pastoral land that covers the area within which the proposed infrastructure will be located. The assessment of the effects on these elements is described below. The existing tracks, leading to the Application Site and linking the southern and northern parcels will be used for the delivery and vehicle movement to the entrance of the site. At this stage it is envisaged that there would be no requirement for any tree removal.

5.4.20 In order to quantify the potential effects upon landscape elements the total area of the Application Site was calculated in order to establish the total resource available.

5.4.21 Implementation of the Proposed Development would result in the change to approx. 6.3ha of improved grassland (refer to Chapter 6 for details) which would be utilised for solar panels, associated transformers, switchgear substations and AC boxes, and tracks. The grassland beneath the solar panels would be supplemented by an appropriate grass mix to enhance biodiversity, and this could be regarded as a beneficial change in landscape character terms. This is further explained in the Biodiversity report (Chapter 6). The proposed solar panels occupy approx. 5.77ha but due to their light footprint only the metal frames would have direct effect on the ground cover. This would be minimal and considered to be a negligible change of neutral nature and not significant.

5.4.22 In addition, approx. 0.5ha would be lost to create the new internal access tracks. These would be constructed with a local stone to reflect the geology of the local landscape, and resemble the existing access track that links the two parcels of the Application Site. Most importantly the internal access track would utilise the existing field gates. With regard to tree and hedgerow vegetation, as stated in the

Arboricultural Survey, Impact Assessment and Protection Plan (**Appendix 5.2**) some limited removal of structural vegetation would be required to accommodate the security fencing and some of the access tracks.

5.4.23 The Site's boundaries are characterised by hedgerows, hedgerow trees and woodland planting. None of the trees within the Site's boundaries appear to be protected by any Tree Preservation Order (TPO) or be part of a designed or designated landscape. Similarly, the hedgerow vegetation represents a traditional but typical field boundary treatment. For this reason, the value of tree and shrub vegetation is considered to be medium. In terms of susceptibility of the hedgerows vegetation this is considered to be medium to the proposals with this type of vegetation requiring some time to mature and establish as a landscape element. Trees, as a landscape feature are generally more difficult to replace and require long time to establish, thus are judged to be of high susceptibility. Overall, the sensitivity of hedgerow vegetation is medium and tree vegetation high.

5.4.24 Based on the information provided in the Arboricultural Survey, Impact Assessment and Protection Plan (**Appendix 5.2**) the removed vegetation would represent a very small amount of the Application Site's overall hedgerow and tree resource. Therefore, the proposals would have a negligible magnitude of change and the degree of effects on the landscape elements associated with the Application Site in the short term would be negligible neutral and not significant.

Potential Effects on Landscape Character / LANDMAP

5.4.25 The potential effects on the LANDMAP aspect areas and overall landscape character of the local area, and indeed the character and perception of the Brecon Beacons National Park would be temporary. The most relevant would be the construction works themselves, movement across the Application Site, and potential influence on the perceptual qualities of the landscape /LANDMAP aspect areas.

5.4.26 Considering the enclosed nature of the Application Site, low profile of the proposed solar panels, and required construction plant, it is unlikely that such operational activities would have a significant effect on the character of the local landscape. For this reason the effects of the construction stage on LANDMAP are not considered any further in this assessment.

Potential Effects on Visual Receptors

5.4.27 The site visit confirmed that due to the distance, nature and complexity of views the construction phase would not form a feature or be easily identifiable from the majority of the identified visual receptors.

5.4.28 In some cases, for example close range locations or more elevated views, the receptors would overlook the Application Site, and would gain less restricted views of the construction activates. Movement of plant across the Application Site, construction work, erection of solar panels and fencing etc would be visible. The majority of the identified viewpoints, however, are distant and the Application Site and its associated construction phase would be perceived as a relatively small component in the overall panorama. Furthermore, such change would be temporary although incremental with the Proposed Development becoming increasingly more evident and unified as a coherent development.

5.4.29 It is predicted that none of the identified visual receptors would be significantly affected except for the users of the PRoWs that cross and abut the Application

Site. Details of the construction work, plant movement and operational hours are provided in the Transport & Access Assessment (Chapter 8), where the effects of traffic upon the users of PRoWs are also assessed. It is worth reiterating that the views from these PRoWs would be gained along a relatively short sections, with views often interrupted by established trees that separate the Application Site into two parcels, and experienced at a local level. The overall appreciation of the open countryside would not be changed. Overall, the magnitude of change is considered to be high as one passes the Application Site but negligible when taken into account the whole length of these routes. The visual effects therefore would be major adverse and significant at the site level but not experienced beyond the immediate environs of the Application Site and nearby locations for example Viewpoint 1.

Operation

5.4.30 Effects on landscape character are the changes to areas of distinctive landscape character that result from the introduction of the Proposed Development. The assessment of effects on landscape character i.e LANDMAP aspect areas is carried out in two parts:

- The assessment of effects on current landscape character through analysis of LANDMAP layers and corresponding aspect areas;
- The assessment of effects on the landscape of the Brecon Beacons National Park through the analysis of its Landscape Character Areas, and special qualities.

5.4.31 The first step has been carried out in **Table 5.3** LANDMAP Aspect Areas within the Application Site and **Table 5.4** Summary of potentially affected aspect areas (as identified at the 'baseline condition' stage) as part of the baseline review. Following the scoping process it is concluded that the following aspect areas and areas of the National Park should be subject to more detailed treatment to assess their potential to be significantly affected by the Proposed Development.

LANDMAP – Geological Landscape

BRCKNGL773 Cefn Maw

5.4.32 The sensitivity of this aspect area has been taken as high to reflect the adopted methodology for this assessment and outstanding overall evaluation listed in the collector sheet.

5.4.33 The Proposed Development is unlikely to cause any significant adverse effects upon this aspect area. Due to their low-lying profile the solar panels tend to follow and reflect the landform thus this aspect of the Application Site and the BRCKNGL773 Cefn Maw aspect area would not be changed. The large scale of the landform, being part of the larger landform associated with the Brecon Beacons, is judged to be able to absorb the Proposed Development due to its relatively modest scale. There would be no visual competition between the solar arrays and other associated infrastructure, and the landform of the BRCKNGL773 Cefn Maw aspect area. The solar panels would respond to the underlying topography of this aspect area following the gently sloping contours. The perception of the scale and experience of the landform would not be significantly changed. It is considered that due to the limited physical extent of the Proposed Development across the BRCKNGL773 Cefn Maw aspect area the magnitude of change would be negligible and effects negligible neutral and not significant.

LANDMAP – Landscape Habitats

BRCKNLH101 Ystradowen

5.4.34 The sensitivity of this aspect area has been taken as low to reflect the adopted methodology for this LVIA and outstanding overall evaluation listed in the collector sheet.

5.4.35 Based on the collector sheet for BRCKNLH101 Ystradowen it transpires that this particular aspect area is characterised by conifer plantations and improved pastures. The Proposed Development would assist in reinforcing the existing hedgerow vegetation, but such change would not have a noticeable effect upon the landscape. Geographically this is a relatively small aspect area, confided to the Application Site and area to the east, and enclosed by the woodland plantation further east. The perception of seasonal changes would be reduced to a degree but from a landscape character point of view the biodiversity improvements to the grassland and hedgerow boundaries would balance any adverse effects. The magnitude of change is considered to be negligible and neutral. On that basis the degree of effects would be negligible and neutral, and not significant.

LANDMAP – Visual & Sensory

5.4.36 The review of the aspect areas associated with the Visual & Sensory layer has been carried out in accordance with the LANDMAP Guidance Note 3. Those aspect areas of low evaluation, or where the theoretical visibility of the Proposed Development is very limited, or does not occur at all, have been excluded and these include:

- BRCKNVS005 Ystradgynlais, Gurnos and Twrch;
- BRCKNVS926 Nant Helen Open Cast/Reclamation;
- CRMRTVS576 Black Mountain southern slopes;
- NPTVS149 Cwm Aman;
- NPTVS184 Swansea Valley (settlements);
- NPTVS215 Upland settlements;
- NPTVS226 Gwauncaegurwen works;
- NPTVS286 Swansea Valley (bottom);
- NPTVS359 Crynant Forest;
- NPTVS458 Swansea Valley (south face); and
- NPTVS575 Cwm Gors.

5.4.37 The site visit and review of the site photography assisted in shortlisting the remaining aspect areas further. The following aspect areas were judged to be relevant and potentially significantly affected:

- BRCKNVS118 Dorwen ar Gledd;
- BRCKNVS365 Bryn Henllys Open Cast;
- CRMRTVS008 Black Mountain south eastern fringes;
- CRMRTVS016 The Black Mountain; and
- NPTVS344 Cwm Twrch.

5.4.38 The remaining aspect areas have been omitted from further assessment. This was due to the visual context, presence of urban environment or elements of

infrastructure in the foreground or wider panorama, distance and /or limited potential for views to be gained.

BRCKNVS118 Dorwen ar Gledd

5.4.39 The sensitivity of this aspect area has been taken as high, based on the adopted methodology for this LVIA and the outstanding overall evaluation and value listed in the collector sheet. This aspect area is described as:

> **"The area is a large scale exposed limestone upland massif rising to 550m AOD from 205m AOD in Tawe valley. It is potted with shakeholes and evidence of quarrying, now defunct. Its uneven appearance distinguishes it from the smoother lines of Fan Hir to the north. The vegetation cover is coarse grasses, heath, bracken/gorse and other scrub encroaching from lower levels. The land form is particularly distinctive viewed from the Tawe valley."**

5.4.40 The Proposed Development would not be located in this aspect area thus any potential effects will relate to the perception of this particular landscape. The SZTV plan (**Figure 5.7**) illustrates patches of theoretical visibility from the elevated and more distant parts of this aspect area and over 2km away. Considering the distance and difference in levels the perception of the Proposed Development would be greatly reduced and the landscape character of this aspect area would not be changed or redefined. From the southern most part of this aspect area, which coincide with the edge of the National Park, the level of inter-visibility with the Proposed Development would increase slightly. This is illustrated by Viewpoint 1 (**Figure 5.9**). Change in the land cover, field pattern created by woodlands and hedgerows, however, would clearly mark the transition. The proposals would be perceived as part of this different type of landscape. The proposed solar panels and associated infrastructure would be physically and visually contained by the boundary vegetation that enclose the Proposed Development and restricts its visibility. The inter-visibility with other adjacent landscape such as the elevated Farteg Hill, Mynydd Allt-y-grug or Mynydd Uchaf would not be obstructed or affected with no visual competition between these landforms and the Proposed Development. The Proposed Development would bring about some change due to the increase perception of human presence, but this would be only limited to the southern most part of this aspect area. This would result in a low magnitude of change locally but negligible change for the whole of this aspect area. On this basis the degree of effects would be moderate and significant locally i.e. within the approx. 1km distance from the boundary of the Proposed Development. The Proposed Development, however, would have a negligible neutral effects on the landscape character of the BRCKNVS118 Dorwen ar Gledd as a whole which would not be significant.

BRCKNVS365 Bryn Henllys Open Cast

5.4.41 The sensitivity of this aspect area has been taken as low reflecting the adopted methodology for this LVIA and low overall evaluation listed in the collector sheet. This aspect area is the host landscape hence has been included in the detailed assessment. This is in accordance with the LANDMAP Guidance Note 3. This aspect area is described as:

> **"The site is a former opencast mine and subsequently a tip perched above Cwm Twrch Uchaf, which has now been reclaimed into fields used for grazing. There are some limited young plantations and a pond in open land to the north. The**

> **field boundaries are generally fenced and the structure of the landscape has yet to establish making the area feel relatively bare and open. There are views to the hills to the north. The area is screened to the east by forestry and woodland."**

5.4.42 The Proposed Development would reflect and fit into the established field pattern brining opportunities for enhancement to the boundary hedgerows and tree planting. The large scale of this aspect area is considered suitable for the modest scale of the Proposed Development with the proposals compatible in landscape character terms. The geometric and planned layout of the solar arrays would echo the angular fields and organised pattern of this landscape. The magnitude of change is considered low adverse. With low sensitivity the Proposed Development would bring about a low adverse effect, which would not be significant.

CRMRTVS008 Black Mountain south eastern fringes

5.4.43 The sensitivity of this aspect area has been taken as medium on the basis of the moderate overall evaluation, moderate value, and moderate rarity listed in the collector sheet. This reflects the adopted methodology for this LVIA. This aspect area is described as:

> **"Sloping valley/hillsides running down from the Black Mountain moorland 250mAOD to around 150mAOD in the valley to the east. This moorland fringe is a mix of small-medium sized fields and larger rectilinear enclosures with a rough grazing character associated with the moorland. Field boundaries tend either to be outgrown and gappy hedges and wire fences giving the area a marginal, exposed character. Settlement pattern is either very sparse and scattered small farmsteads to the east or more recent linear, gappy development of dwellings to the west along the A4068. The latter are associated with marginal uses in some cases, such as vehicle breaking, and have an edge character with the desolate moorland behind them. Tree cover is concentrated on steep valley sides and near watercourses . The area is dominated by and has views up to the Black Mountain."**

5.4.44 The Proposed Development would not be located in this aspect area thus any potential effects will relate to the perception of this particular landscape. According to the SZTV plan (**Figure 5.8)** the Proposed Development would be theoretically visible across a relatively large tracts of this aspect area. In reality however, and as confirmed by the site visit, views of the Proposed Development would not be gained being screened by the woodland vegetation that skirts the western edge of the Application Site as illustrated by Viewpoint 9 (**Figure 5.9** and **5.10**). The central and southern parts of this landscape may offer some restricted views towards the Proposed Development, but views would be considerably restricted and limited to small areas within the northern parcel rather than the whole of the Proposed Development. Views would include other forms of infrastructure, the electricity pylons in the more distant landscape seen in the same direction, settlements in the valley, and the open cast mine to the south west. These features would act to reduce the degree of change. Most importantly, views towards the Black Mountains and Brecon Beacons National Park would not be affected. Overall, the magnitude of change is assessed as being negligible, and the landscape character effects as negligible neutral and not significant.

CRMRTVS016 The Black Mountain

5.4.45 The sensitivity of this aspect area has been taken as high reflecting the adopted methodology for this LVIA and outstanding overall evaluation listed in the collector sheet.

5.4.46 This aspect area is described as:

> **"The area is a large scale exposed limestone and millstone grit upland massif rising to 600m AOD at Foel Fawr and Foel Fraith from 200m AOD on the western fringes. It has some rock exposure in scree and outcrops and is potted with shakeholes and evidence of limestone quarrying, now defunct, on its northern flanks. Its uneven appearance distinguishes it from the smoother lines of sandstone to the north. Small incised valleys are evident in places with rocky stream beds and some scrub. The vegetation cover is dominated by coarse grasses with some heath/dwarf woody upland shrubs. The skyline is generally gently undulating with some high points and forms a strong backcloth to the surrounding lowland to the north and south. The rights of way are limited but the area is open access land and the Beacons Way runs along the northern edge linking to Carreg Cennen to the north. Change detection 2014: Mynydd Bettws windfarm (504) conspicuous from southern parts."**

5.4.47 The Proposed Development would not be located in this aspect area thus any potential effects will relate to the perception of this particular landscape. The smooth and open landscape would continue to be perceived as one where a sense of wilderness prevails. Views of the Proposed Development would be generally distant and over 2km away. The elevated and more distant core area of the CRMRTVS016 The Black Mountain is physically and visually separated. Views from these areas overlook the Application Site which appears as a small and inconspicuous component of the more distant low lying landscape. the majority f the Proposed Development would not be visible with the identified views (Viewpoints 6 – 8) indicating that only a very small part of the northernmost field would be potentially distinguishable in the composite landscape. Views from the southern edges of this aspect area include built form in the valley, open vast mine, and the Mynydd Bettws windfarm to the south indicating change in the landscape character. The magnitude of change is considered to be negligible, and landscape character effects upon the CRMRTVS016 The Black Mountain negligible neutral and not significant.

NPTVS344 Cwm Twrch

5.4.48 The sensitivity of this aspect area has been taken as medium on the basis of the moderate overall evaluation, moderate value, and moderate rarity listed in the collector sheet. This reflects the adopted methodology for this LVIA. This aspect area is described as:

> **"North east face of upland valley ranging from approx 280m AOD to approx 100m AOD. The area is predominantly enclosed grazed land, contained by overgrown hedges, with heavy deciduous tree cover especially in the base of the valley. There are old mine works through the area, producing pockets of localised disturbance. The base of the valley is**

significantly settled, with stone built houses, along the A4068, but with dwellings being mainly outside of the county borough boundary. Views are confined by the built form, topography and tree cover of the area. These elements also produce a sheltered, settled feel compared to surrounding areas."

5.4.49 The Proposed Development would not be located in this aspect area thus any potential effects will relate to the perception of this particular landscape. The character of this landscape is influenced by human presence that is exhibited in the relatively strong field pattern, hedgerow trees and dispersed settlement pattern with built form largely concentrated in Pen-Rhiw-fawr. The north facing slopes of this aspect area have a strong relationship with the surrounding uplands and visual inter-connectivity with the elevated Brecon Beacons to the north. Despite this relatively high level of inter-visibility the visibility of the Proposed Development is relatively limited due to the strong landscape framework around the Application Site, as illustrated by Viewpoint 4 (**Figure 5.9 and 5.10).** The Proposed Development, when seen, would be perceived as a relatively small component of the separate landscape sitting comfortably within the receiving environment. It would not obstruct or redefine views of the elevated Brecon Beacons and there would be no visual competition between the proposed solar panels and the surrounding upland landscapes, and indeed the NPTVS344 Cwm Twrch aspect area. The Proposed Development would bring about a negligible magnitude of change resulting in negligible neutral and not significant landscape character effects.

LANDMAP – Historic Landscape

5.4.50 The review of the aspect areas associated with the Historic Landscape layer has been carried out in accordance with the LANDMAP Guidance Note 3 with those of high and outstanding overall evaluation taken forward for further review. The identified aspect areas were reviewed against the SZTV with the shortlisted aspect areas being:

- BRCKNHL248 Hendre-ladis;
- BRCKNHL595 Mynydd Du;
- BRCKNHL735 Dyffryn Tawe;
- BRCKNHL753 Bryn-henllys;
- CRMRTHL39589 Twynmynydd, Brynpedol;
- CRMRTHL39600 Waun-Gron, Cefn-Bryn-Brain;
- CRMRTHL39601 Ty-Gwyn;
- CRMRTHL39602 Ynys Tre-Deg, Dorwen;
- CRMRTHL40293 Banc Wernwgan-Foel Fraith Quarries;
- CRMRTHL40294 The Black Mountain-Y Mynydd Ddu;
- NPTHL028 Mynydd Marchywel;
- NPTHL029 Mynydd Uchaf (Mynydd y Garth);
- NPTHL040 Bryncoch Cilybebyll; and
- NPTHL041 Clydach Cwm Du.

5.4.51 The site visit and review of the site photography assisted in shortlisting the remaining aspect areas further. The following aspect areas were judged to be relevant and potentially significantly affected:

- BRCKNHL595 Mynydd Du;
- BRCKNHL753 Bryn-henllys; and

- CRMRTHL40294 The Black Mountain-Y Mynydd Ddu.

5.4.52 The remaining aspect areas have been omitted from further assessment. Notwithstanding their strong historic landscapes, presence of features such as stone walls, vernacular architecture or archaeological assets it was considered that the physical and visual segregation from the Proposed Development was sufficient to limit the potentially significant effects on these aspect areas.

BRCKNHL595 Mynydd Du

5.4.53 The sensitivity of this aspect area has been taken as high on the basis of the high overall evaluation, high value, and the majority of evaluation criteria also being high. This reflects the adopted methodology for this LVIA. This aspect area is described as:

> **"Extensive open upland common on The Black Mountain. Early settlement and land use indicated by Mesolithic lithic finds, numerous Bronze Age burial and ritual sites including cairns, standing stones, stone rows and stone circles and possible hut sites, enclosed settlements and clearance cairns. Possible medieval and later seasonal settlements indicated by building platforms and abandoned hut and house sites and shelters. Scattered sheepfolds. Small, scattered and disused quarries and limekilns of post-medieval date. Peat deposits, upland lakes, ponds and bogs of palaeoenvironmental significance."**

5.4.54 The Proposed Development would not be located in this aspect area thus any potential effects will relate to the perception of this particular landscape. The majority of this aspect area is free from the theoretical visibility of the Proposed Development. The sense of historical landscape is strongest in the central and more isolated areas of this landscape and not on its peripheries where the influence of the adjacent landscapes is evident and stronger. As illustrated by Viewpoint 1 (**Figure 5.9**) views of the Proposed Development would be gained from the southernmost parts of this aspect area. Such views, however, would include other neighbouring landscapes where built form, field pattern and other landscape components are also visible. The perception of the unenclosed upland landscape, cairns, remnant quarry sites etc would be diminished and not necessarily part of the same view. The Proposed Development would be identified as a different feature, separate from the upland landscape of the BRCKNHL595 Mynydd Du, and not competing or affecting views of any of the features identified in the LANDMAP collector sheet. On that basis the Proposed Development would bring about a low magnitude of change when perceived from the southernmost parts of this aspect area. When judged in the context of the whole aspect area this would diminish to negligible change. The introduction of the Proposed Development would result in moderate adverse and significant effects upon this aspect area, which would be experienced locally. The effects upon the BRCKNHL595 Mynydd Du as a whole would be negligible neutral and not significant.

BRCKNHL753 Bryn-henllys

5.4.55 This aspect area has been assessed in the LANDMAP collector sheet as being of low overall evaluation with the remaining evaluation criteria also low. This is the host landscape for the Proposed Development hence its inclusion in this LVIA. The sensitivity of this aspect area has been taken as low, in accordance with the adopted methodology for this LVIA. This aspect area is described as:

> **"Extensive area of active opencast coal mining. Formerly area of deep mining sitting within a post medieval agricultural landscape - opencast being started firstly in the mid C20th and then reopend in the early 1990s. The present landscape is a combination of residual moorland, relict agriculture, relict mining, 1960s post opencast land reclamation and forestry and modern opencast mining."**

5.4.56 The reclaimed nature of this landscape, particularly around the Application Site, is perhaps less evident to a casual observer. This is somewhat confirmed by the description in the collector sheet:

> **"Re-worked opencast mine, 'overlying' previously worked and reclaimed opencast, but now itself mostly worked out and reinstated as agricultural land. Little or no pre-mining landscape survives."**

5.4.57 The Proposed Development would retain the existing hedgerows and boundary treatment. These features have been identified in the LANDMAP collector sheet as characteristic for this aspect area. The organised and geometric layout of the proposals would respond to the regular fieldscapes of this aspect area. The Proposed Development would have a low magnitude of change with the effects assessed as being minor and not significant.

CRMRTHL40294 The Black Mountain-Y Mynydd Ddu

5.4.58 The sensitivity of this aspect area has been taken as high on the basis of the adopted methodology for this LVIA, the outstanding overall evaluation and value, and the majority of evaluation criteria also being outstanding. This aspect area is described as:

> **"Most significant archaeological element(s): 18th 19th century quarrying, bronze age summit cairns, medieval and postmedieval deserted settlements."**

5.4.59 Based on the assessment included in the LANDMAP collector sheet this aspect area includes a number of archaeological assets. These assets include stone monuments, dry stone walls and other stone structures, some of which have been associated with the historic land use of the area. The aspect area is also described as:

> **"Landscape is 'complete' with little modern development/intrusion to hinder the visibility of the overall landscape and its patterns, although there is an absence of variety in this landscape."**

5.4.60 The Proposed Development would be visually and physically separated from this aspect area. Due to its low profile it would be largely screened and not visible

from this landscape, limiting and potential for visual competition. This has been confirmed by the site visit and illustrated by the selected Viewpoints 6 - 8 (**Figure 5.8**). The Proposed Development is considered to bring about a negligible magnitude of change with the effects upon the CRMRTHL40294 The Black Mountain-Y Mynydd Ddu aspect area being negligible and neutral and not significant.

LANDMAP – Cultural Landscape

5.4.61 The majority of Cultural Landscape aspect areas within the study area have been assessed in LANDMAP collector sheets as being of high or outstanding overall evaluation. This is not particularly useful in determining the potentially significantly affected areas. The second tier scoping out process has been applied whereby only those aspect areas with high or outstanding rarity and/or group value have been taken forward. The identified aspect areas were reviewed against the SZTV and where there was no theoretical visibility, or it was very limited (and confirmed on site) these aspect areas have been omitted. Furthermore, the description of the remaining aspect areas was reviewed, and their cultural context determined, with the following aspect areas shortlisted for a detailed assessment:

- BRCKNCL847 Brecon Beacons National Park;
- BRCKNCL957 Black Mountain Mynydd Myddfai; and
- CRMRTCL586 Mynydd Myddfai and Black Mountains.

BRCKNCL847 Brecon Beacons National Park

5.4.62 This is the host landscape for the Proposed Development. The sensitivity of this aspect area has been taken as high on the basis of the adopted methodology for this LVIA, the outstanding overall evaluation and value, and the majority of evaluation criteria being very rare or exceptional. This aspect area is described as:

> **"The BBNP located close to large conurbations is one of the most popular National Parks in Wales not only for visiting but also for living. The high standards of conservation coupled with the outstanding scenery give it very special significance. It is an area where farming is an important part of the ecomony and influencing the character of the landscape. Culturally there is diversity across the Park exemplified by wealth distribution and the concomitant manifestation and distribution of the Welsh language. The NPA is acutely aware of these cultural differences and has given due cognisance in their liaison with local communities. As with many other areas of Wales the cultural nature of the Park is undergoing change as external influences are continuing to effect cultural change. An example is the rapidly increasing level of house prices and the general levels of income generated locally."**

5.4.63 It is worth reiterating that this aspect area lies outside of the Brecon Beacons National Park boundaries, although has been recognised by the LANDMAP as part of its cultural landscape. The Proposed Development would add some complexity to this aspect area but would be directly related to the identified dominant cultural context, which includes infrastructure. Furthermore, it would be compatible with the features that have been identified as particularly significant in terms of the cultural landscape character of this aspect area, that is the power generation and distribution. The Proposed Development would reinforce these

characteristics whilst not affecting the public access or agricultural land use across the majority of this aspect area. This aspect area covers large tracts of the landscape and the introduction of the Proposed Development would have only localised effects. It is considered that locally the degree of change would be low diminishing to negligible in the context of the whole aspect area. The effects therefore would be moderate and significant locally but negligible neutral and not significant for the whole of the BRCKNCL847 Brecon Beacons National Park aspect area.

BRCKNCL957 Black Mountain Mynydd Myddfai

5.4.64 The sensitivity of this aspect area has been taken as high on the basis of the adopted methodology for this LVIA, the outstanding overall evaluation and value, and some of the evaluation criteria also being very rare or exceptional. The aspect area is described as:

> **"Rolling upland landscape comprising mountains and foothills dissected by valleys situated on the north west side of the Black Mountain, rich in diverse evidence of land use from the prehistoric period to the recent past. Historic legendary associations with the Lady of Llyn y fan fach and the Physicians of Myddfai."**

5.4.65 The Proposed Development would not be located in this aspect area thus any potential effects will relate to the perception of this particular landscape. Based on the published description the cultural associations of this aspect area relate to the land use, which in turns reflects the landform and geology of the landscape. The majority of this aspect area is free from any theoretical visibility of the Proposed Development. Viewpoint 1 (**Figure 5.9**) illustrates that the proposals would be visible from the edge of this particular aspect area. Such views, however, are orientated south where the appreciation of the BRCKNCL957 Black Mountain Mynydd Myddfai becomes considerably reduced with the adjacent landscapes exerting an increasing influence. The overall change to cultural layer of this landscape is considered to be negligible. The Proposed Development would bring about a negligible magnitude of change, resulting in the effects being negligible neutral and not significant.

CRMRTCL586 Mynydd Myddfai and Black Mountains

5.4.66 The sensitivity of this aspect area has been taken as high on the basis of the adopted methodology for this LVIA, the outstanding overall evaluation and value, and some of the evaluation criteria also being very rare or exceptional. The description of this aspect area includes references to artists, prominent individuals, and specific locations important to the Welsh history. The summary description of this aspect area states:

> **"A landscape that is resonant with folklore associations and which is rich in historic sites, recognised by the fact that much, though not all, of this area is in the Cadw/ICOMOS/CCW Register of Landscapes of Outstanding Historic Significance."**

5.4.67 The Proposed Development would not be located in this aspect area thus any potential effects will relate to the perception of this particular landscape. The limited and distant inter-visibility with the Proposed Development would ensure that the perception of the cultural aspects of this landscape would not be changed or redefined. Where views of the Proposed Development can be gained, as

illustrated by Viewpoints 6 – 8 (**Figure 5.9** and **5.10**) the defining characteristics of this aspect area would prevail and continue to be dominant. The introduction of the Proposed Development would result in a negligible magnitude of change, with the effects negligible neutral and not significant.

Brecon Beacons National Park

5.4.68 The Brecon Beacons National Park Authority has published its own landscape character assessment, dated August 2012. In addition the Authority has published the Supplementary Planning Guidance: Landscape adopted April 2019.

5.4.69 Based on the Landscape Character Areas map, part of the published assessment, the Proposed Development falls in proximity to the Landscape Character Area (LCA) 4 Waterfall Country and Southern Valleys and LCA 2 Y Mynydd Du. These two LCAs coincide with the LANDMAP aspect areas assessed in the previous subsection of this LVA, where the effects have been assessed as negligible neutral and not significant with localised moderate significant effects within approximately 1km radii of the Proposed Development. Such significant effects would therefor occur only on the periphery of the LCA 4 Waterfall Country and Southern Valleys and LCA 2 Y Mynydd Du. The overall landscape character and their perception would not be changed or redefined.

5.4.70 With regard to the National Park's Special Qualities, as identified in its Management Plan, these can be grouped into categories depending on their nature. It transpires that the majority of them relate to landform and geology, flora and fauna, cultural and historic associations, but also perceptual and sensory aspects of the landscape.

5.4.71 The Proposed Development, by being positioned away from the boundary of the National Park would not have any direct effects upon its landscape and Special Qualities. There is an evident change in landscape character terms between the unenclosed uplands of the Brecon Beacons and fieldscape around the Application Site. This creates a strong separation between the landscape of the National Park and adjacent countryside, emphasised by belts of trees that skirt its edge. Any change introduced by the Proposed Development would read as part of a different landscape. The low profile and enclosure provided by the field boundaries of the Application Site would ensure that the Proposed Development would be restricted and not compete visually with any of the identified features that make the National Park's landscape special. It is considered that the landscape character of the Brecon Beacons National Park and its Special Qualities would not be changed to a significant degree.

Visual Receptors

5.4.72 The site visit established that the landscape framework that surrounds the Application Site screens and controls views, and the Proposed Development would not be visible from the majority of the visual receptors identified at the baseline stage. This includes the isolated farmsteads immediately south of the Application Site but also the settlements in the valley that follow the A4068 and extend onto the upper valley slopes. Initially the settlement of Ystradowen was considered for further assessment but the site visit confirmed that the combination of street trees and vegetation in the valley of the River Twrch would screen views towards the Proposed Development.

5.4.73 A number of isolated properties and farmsteads are dotted around, particularly to the north west and south of the Application Site, as identified on the OS Explorer map 1:25,000. These properties benefit form their own landscape setting. Due to

changes in levels their views would overlook the Proposed Development and its visual influence would be limited. Based on the site visit it was considered that none of these visual receptors would be subject to potentially significant effects, hence they have not been included in the detailed assessment.

5.4.74 In order to consider the visual effects upon the users of PRoWs within the study area and recreational receptors within the Open Access Land a preliminary review of the selected viewpoints has been carried out. This scoping out process helps to identify these locations from where the visibility of the Proposed Development may potentially affect the receptors to a significant degree. Based on the on-site assessment and review of the site photographs the following viewpoints have been considered relevant:

- Viewpoint 1;
- Viewpoint 3;
- Viewpoint 4;

5.4.75 In addition, the assessment will include a review of the inter-visibility at Viewpoint 6 – 8. This will help to ascertain, and confirm to the Council and the National Park Authority, the potential visual effects from within the close quarters of the Brecon Beacons National Park as seen from the north west.

5.4.76 With regards to the sensitivity of the shortlisted visual receptors this is assessed as high. This is on the basis of the high value of the views due to the presence of the statutory landscape designation and is compatible with the Box 5.1 of the GLVIA 3rd Edition. With regards to the susceptibility this is taken as medium based on the landscape characteristics of the assessed LANDMAP aspect areas.

Viewpoint 1: View from public footpath, Brecon Beacons National Park, north-east of Application Site.

Figure 5.9 *and* ***5.10***

5.4.77 This location illustrates views from the southern edge of the National Park as one travels towards the Proposed Development. This location is relatively elevated in comparison with the remaining section of the footpath, particularly the section that skirts the edge of the Application Site. Further north-east views become slightly obscured by the localised changes in the topography, increasingly distant, and visually removed from the landscape around the Application Site. The northernmost field of the Proposed Development is visible with the remaining field sin the northern parcel considerably screened by the boundary hedgerows and changes in levels. The southern parcel of the Proposed Development is not visible in this view, and this public footpath.

5.4.78 This is one of the first locations along this PRoW from where the receptors would gain views of the Proposed Development. The receptors would be looking at the back of the solar panels which would appear dark and recessive in this view, both in summer and winter views. Due to their low profile the solar panels would respond to the gently sloping topography of the surrounding landscape seen in the middle ground. There is a clear change in land cover and character of the landscape, with fieldscape not evident or present in the more distant parts of the National Park. The Proposed Development would form a relatively modest element in this view which is a 360 wide and exposed panorama. The appreciation of the elevated uplands visible to the south would continue to provide an attractive backcloth and there would be no visual competition with any of the landscape features seen in this view. The large scale of the landscape and openness would diminish the scale of the Proposed Development. Views of the

associated infrastructure such as substations etc would be also limited. The security fence due to its light footprint and structure would not form a feature and careful positioning of the CCTV cameras would not detract from this view. The introduction of the Proposed Development would bring about a medium magnitude of change resulting in major and significant effects upon the receptors at this location. This degree of effects is likely to be experienced along a short section of the footpath as receptors descend south from the higher ground around Viewpoint 1. The remaining section of this PRoW is relatively low lying in relation to the Application Site. This, coupled with the reinforced hedgerow vegetation along the eastern perimeter of the Application Site, would assist in controlling views of the Proposed Development to a considerable degree. Views from this particular section of the PRoW would not be significant.

Viewpoint 3: Open Access Land west of Pen-Rhiw-fawr on Gwrhyd Road, south-west of Application Site

Figure 5.9

5.4.79 This viewpoint has been positioned along the road verge as being the most likely place for travelling receptors to stop and appreciate views. Views gained from within the adjacent Open Access Land would provide for a more diverse and complex view of the valley landscape and associated infrastructure, including the nearby open cast mine. It was considered that this would skew the visual assessment, not giving a proper regard to the views from the more elevated and isolated parts of this upland landscape, whilst taking into account a variety of receptors. The Application Site can be identified due to its field pattern contrasting with the more open and unenclosed uplands and presence of the nearby reservoir.

5.4.80 The Proposed Development would appear as a relatively modest scale element in this overall wide and exposed panorama. It would be perceived as part of a different and low lying landscape and not the elevated and dramatic landscape of the Brecon Beacons National Park. The field boundaries would physically curtail the proposals creating a strong sense of separation. The low lying profile of the solar panels would respond to the topography of the Application Site and panels would be seen en masse creating a perception of a coherent layout rather than separate arrays. This view would be generally gained by a limited number of receptors. The Proposed Development would bring about a low magnitude of change, resulting in moderate and significant visual effect.

Viewpoint 4: Coedffaldau north-west of Pen Rhiw Fawr, south-west of Application Site

Figure 5.9 *and* ***5.10***

5.4.81 This viewpoint is located in close proximity to the previously assessed Viewpoint 3 but on a slightly lower ground and the influence of the valley landscape is more evident. The Application Site can be identified with the boundary hedgerows and tree vegetation in the southern parcel creating a strong landscape framework. The landscape appears settled and well wooded, particularly in the valley and lower slopes. The elevated, bare and exposed upland of the Brecon Beacons National Park creates a strong and attractive background.

5.4.82 The Proposed Development would add a new element into the view where other solar farms are not present. Views are slightly closer than those at Viewpoint 3 and the proposed solar panels, due to their arrangement, would somewhat contrast with the sinuous arrangement of hedgerows and woodlands. Their low

profile, however, would follow the local topography reducing any perceived change. Its boundary planting would help retain the separation between the Application Site and adjacent countryside and indeed the upland landscape further to the north. There would be no visual competition with the landform of the Brecon Beacons or the valley landscapes. This view would be generally gained by a limited number of receptors. The magnitude of change is assessed as low and effects of the Proposed Development would be moderate and significant.

Viewpoints 6 – 8 (Viewpoint 6: Open Access Land on Twyn-y-Moch, Brecon Beacons National Park, north-west of Application Site; Viewpoint 7: Public footpath at Waun-y-Ddraenen / Open Access Land, Brecon Beacons National Park, north of Application Site; and Viewpoint 8: Bridleway / Open Access Land on Derlwyn Isaf, Brecon Beacons National Park, north of Application Site)

Figure 5.9 *and* ***5.10***

5.4.83 The assessment of these three static viewpoints is concluded in the round. The visibility of the Application Site does change to a degree, but all three views are characterised by the similar context, angle of view and distance. The character of the views can be described as having a strong background in the form of distant and medium range upland landscapes separated by the wooded valley of the River Twrch and its tributaries. The woodland and tree vegetation climbs onto the upper valley slopes and the peripheries of the upland landscape. The foreground, however, is characterised by unenclosed rough grassland where human presence is sparse, with tree and hedgerow vegetation generally absent.

5.4.84 The Application Site is almost entirely screened with small areas of the northernmost field identifiable in the views. A belt of trees is located to the north of the Application Site and two fields apart and coupled with the presence of cattle in the field adjacent north of the Application Site helps to assess the potential effects. It is evident that the introduction of the Proposed Development would be difficult to identify. Receptors would look at the back of the solar panels, which would appear dark and recessive in the view, both in summer and winter months. The very limited visibility of some solar panels in the northern most field is considered to bring about a negligible magnitude of change. This would result in negligible neutral and not significant effects upon these three locations.

5.4.85 On that basis it is evident that the potential visual effects upon the rest of the Open Access Land in this part of the National Park would also be negligible neutral and not significant.

Road users / SUSTRANS Cycle Route/ PRoWs/ Open Access Land

5.4.86 The SZTV plan (Figure 5.8) illustrates that the majority of such visual receptors would, be free from any theoretical visibility of the Proposed Development. The site visit confirmed that the Proposed Development is unlikely to be visible from the A4069 or the SUSTRANS cycle route no. 437. Users of the various PRoWs that cross the valley landscape and indeed on the upper slopes and within the upland landscapes would not be significantly affected by the introduction of the Proposed Development. This is due to the combination of distance, vegetative screening, and visual context.

5.4.87 The assessment of viewpoints concluded that only three out of ten identified viewpoints are subject to significant effects. This translates into significant effects upon the associated PRoWs where views remain of similar context and level of inter-visibility. This also applies to the PRoW located to the east of the Application Site. It is worth reiterating that this is likely to be limited to certain sections of

the PRoWs and not their entire length. With regards to road users, the effects would not be significant due to the changing context, intervening vegetative screening, and change in direction of travel.

5.4.88 The recreational receptors within the areas of Open Access Land would gain views of detracting elements such as electricity pylons and open cast mine. Views are also 360 degrees, open and exposed hence the visibility of the Proposed Development would have very limited influence on their overall experience. These receptors were assessed, in the round, as not experiencing significant effects.

Additional visual assessment requested by Powys County Council

5.4.89 As outlined in their Scoping Report (dated 1st August 2019), the Council requested a visual assessment of additional areas of the higher ground to the west and south of the site. To the north west lies the rising landform of the Brecon Beacons National Park with the OS Explorer map 1:25,000 indicating various hills including Waun y Ddraenen and Foel Deg (north of Rhosaman). The landscape to the south west is marked by the elevated Mynydd Uchaf and its northern slopes. A large open cast mine, located on its north western slopes, disrupts the contours and forms a strongly degrading feature in the landscape. South of the Application Site lies CefnGwrhyd and the characteristic landform of Mynydd Allt-y-grug.

5.4.90 The site visit confirmed that the horizon to the north, north west and west is defined by a distant elevated landform which dips towards the valley of the River Amman. This line of hills is formed by Foel Fraith, Garreg Lwyd, Blaenpedol, Tair Carn Isaf and Foel Deg ar Bedol. This is a large scale landscape, elevated and denude of tree vegetation, empty and desolate. The A4069 connects Brynamman in the valley and leads north dissecting this elevated landscape. The route includes a number of car parks and designated viewpoints, reflecting the scenic quality of the landscape. There is one bridleway and two relatively short public footpaths that cross this part of the Brecon Beacons, but the area is covered by Open Access Land and public access is not restricted to one particular route or location.

5.4.91 The screened ZTV plan indicates that theoretically the Proposed Development would be visible from these elevated hills. The site visit, however, confirmed that the tree vegetation that lines the western boundary of the northern parcel interrupts views and in parts screen the distant elevated landscape to the west and north west. Topographically the northern parcel slopes to the west with its central area slightly higher than the western and eastern boundaries, nevertheless large areas of the proposed solar panels would be screened. It is likely that, due to the distance, the Proposed Development would appear as a small element, part of a composite and elevated panorama. A number of detracting factors such as the nearby settlements, roads and indeed the open case mine will form the foreground and /or middle ground in these views. The Proposed Development would be difficult to identify in this view and its introduction would have a negligible magnitude of change upon such views.

5.4.92 With regards to the landscape to the south of the Application Site the area is dissected by a number of Public Rights of Ways. Extensive areas of Open Access Land also cover the northern slopes of Mynydd Uchaf providing a variety of views in different directions. Due to proximity and difference in height views of the Proposed Development gained from the Open Access Land will be relatively frequent. As discussed in the previous paragraphs, however, the variety of views and directions prevents the receptors from involuntary views of the proposed solar farm. The presence of the open cast mine represents a strong detractor and

departure for the prevailing land use, one that would be visible by receptors and redefining their perception of the surrounding landscape to a considerable degree. Where the screened ZTV plan indicates patches of theoretical visibility, those often fall within areas of no public access. The majority of the PRoWs would therefore not be affected. Where views would be theoretically gained these are likely to be screened or restricted with occasional and glimpsed views of the proposed Development, as illustrated by Viewpoints 2 and 4. In such views the rural character of the foreground will continue to exert a strong influence on the visual amenity with the Proposed Development visible in the middle ground, forming a new feature curtailed by a strong landscape framework. In certain views the introduction of the Proposed Development would introduce a medium magnitude of change, particularly where views are channelled or framed. The visual amenity of the associated PRoWs, however, is likely to be affected to a lesser degree due to the presence of field boundary vegetation. On balance, and taking into account the length of these PRoWs and variety of views, the magnitude of change will vary from negligible to low, depending on the presence of vegetative screening. On that basis, the degree of effects would vary from negligible neutral to moderate adverse and significant.

5.5 MITIGATION AND ENHANCEMENT

5.5.1 This section describes the landscape and visual mitigation measures which have been incorporated through the iterative design of the Proposed Development in order to prevent, reduce or offset potentially adverse landscape and visual effects caused by the construction, operation and decommissioning phase.

Mitigation by Design

5.5.2 The design of the Proposed Development is a vital part of the EIA process as it is the stage where the biggest contribution can be made to mitigate potential landscape and visual effects, creating a solar farm which is appropriate for the existing landscape character and visual features of an area.

5.5.3 Measures that have been taken to mitigate the effects on landscape and visual resource during construction would include:

- Design to minimise vegetation removal;
- Control of construction night lighting to minimise effects on sensitive views and night time light pollution;
- Location of the construction compound;
- Design to minimise land take; and
- Spreading of topsoil and reseeding and planting as soon as sections of work are complete.

5.5.4 The construction compound has been located within the area of the consented Bryn Henlyss Solar Farm. This ensures that there will be no additional land intake that cannot be accommodated into the already permitted scheme. This also enables a coordinated construction phase, which will limit any potentially adverse effects on landscape elements and visual amenity.

5.5.5 The trench for the underground cables between the solar panels and substation will be as small as practical and incorporated within existing access tracks and roads. Any works and disruption would be temporary only and the area affected reinstated to the previous condition. The grid connection will be via the consented Bryn Henllys Solar Farm, hence no additional change will be experienced during the construction stage.

5.5.6 The design and layout of the Proposed Development has been developed to form a simple and unified development that presents a clear relationship to the landscape pattern curtailed within the existing landscape framework.

5.5.7 The access tracks will be routed where possible to follow the line of the land with minimal use of cuttings and embankments, whilst utilising the existing field gates and farm access. Following the design process as part of the mitigation measures, the solar panels were offset from the boundary vegetation. This will ensure long term retention and good condition of this vegetation.

5.5.8 The AC boxes, transformer enclosure, switchgear and production substation, along with the MV&LV Kiosk Details substations will be painted Moss Green colour (RAL 6005) as indicated on the technical drawings. This colour has been selected to minimise their visibility and help blend with the prevailing colours of the Application Site and the nearby woodland trees.

5.5.9 All the ancillary infrastructure of the Transformers, Switchgear Substation and AC Boxes would be grouped and positioned near the field boundaries, as far as practical. This would reduce their visual effect upon views from the nearest public footpath and all other close and medium range viewpoints.

5.5.10 A detailed survey of tree and hedgerow vegetation, within and around the Application Site, has been carried out to inform the layout (Appendix 5.2). Consequently, the location of the solar panels has been adjusted to avoid the Root Protection Zone of the boundary vegetation.

5.5.11 Due to the characteristic of the proposed development there are no further mitigation measures that could be deployed to reduce potential significant effects.

Decommissioning controls

5.5.12 Decommissioning phase, similar to the construction stage would be temporary. The use of equipment and lighting would be reduced to avoid any visual intrusion and minimise any effects.

Additional Mitigation

5.5.13 During the assessment it was considered beneficial to reinforce the landscape framework within and around the Application Site by providing additional areas of woodland planting. Such form of planting has been considered beneficial to the landscape character by introducing additional tree planting, improvements to the quality and condition of the field boundary vegetation and responding to the management guidelines included in the collector sheets for the LANDMAP relevant aspect areas.

5.5.14 It was considered that an additional woodland planning along the northern boundary of the Application Ste would be most successful in achieving such objectives. The hedgerow vegetation along the eastern boundary of the northern parcel would be reinforced to assist in enhancing the local landscape and restrict views from the adjacent PRoW. A detailed planting plan is provided at **Figure 5.13**.

Residual Effects

5.5.15 The above outlined mitigation measures have been incorporated into the layout with the additional measures accounted for during the assessment process. Following the implementation of the proposed mitigation measures the effects

have been re-assessed in order to establish the residual effects. These are outlined below. It is envisaged that the effectiveness of the proposed woodland planting and reinforced hedgerow boundaries would be evident at Year 5.

5.5.16 With such mitigation measures being implemented the effects upon the host LANDMAP – Landscape Habitats BRCKNLH101 Ystradowen would change from negligible neutral to minor beneficial. These would not be significant but have been re-assessed to highlight the beneficial effects of the Proposed Development.

5.5.17 With regards to the remaining layers of the LANDMAP the Visual & Sensory aspect areas would all experience some level of beneficial change. The increased level of screening along the boundaries of the northern parcel would restrict the visibility of the Proposed Development from the northern part of the study area to a greater degree. The residual effects upon the BRCKNVS118 Dorwen ar Gledd would reduce to negligible neutral within the southern parts of this aspect area. The same would apply to the BRCKNVS365 Bryn Henllys Open Cast aspect area where the residual landscape character effects would be negligible neutral and not significant.

5.5.18 With regards to the Historic Layer and Cultural Layer, all assessed aspect areas would experience some beneficial change due to the limited level of inter-visibility with the Proposed Development. The residual effects for the Historic Layer BRCKNHL595 Mynydd Du, and BRCKNHL753 Bryn-henllys would diminish to negligible neutral and not significant. Similarly the residual effects upon the Cultural Landscape Layer: BRCKNCL847 Brecon Beacons National Park would be negligible neutral and not significant.

5.5.19 With regards to the Brecon Beacons National Park, the degree of change upon the perception of the landscape in its southernmost part, would diminish to negligible neutral and not significant.

5.5.20 With regards to static views, the residual effects upon the receptors at Viewpoint 1, Viewpoint 3, and Viewpoint 4 would remain significant during the first 5-8 years. After that period the residual effects for Viewpoint 1 are likely to diminish to negligible. This takes into account the existing context, presence of wind farms and open cast mine in the view. The residual effects for the remaining viewpoints would not change.

5.5.21 With regard to the low lying section of the public footpath, along the eastern boundary of the Application Site, the residual effects are likely to be negligible neutral. The residual effects for other more elevated sections of PRoWs, however, would remain significant.

Table 5.7: Mitigation

Ref	Measure to avoid, reduce or manage any adverse effects and/or to deliver beneficial effects	How measure would be secured		
		By Design	By S.106	By Condition
1.	Arrangement of solar panels and offset from Root Protection Zone	X	-	-
2.	Layout of access track.	X	-	-
3.	Location of AC Boxes, substations etc	X	-	-
4.	Planting of native woodland along the northern and western boundaries of the northern parcel.	-	-	X
5.	Management of existing hedgerows, along the eastern boundary of the northern parcel, to improve condition and increase height to 5-6m.	-	-	X
6.	Management of existing internal hedgerows in the northern parcel, to increase height to 3-4m.	-	-	X
7.	Planting of native woodland along the southern boundary of the southern parcel.	-	-	X

Enhancements

5.5.22 The change from improved pastures, as the predominant land cover within the Application Site, to species rich grassland maintained for biodiversity, is considered to be an enhancement. The beneficial effects, however, relate to ecology and not landscape or visual issues.

5.6 CUMULATIVE AND IN-COMBINATION EFFECTS

5.6.1 This section presents an assessment of the potential cumulative landscape and visual effects of the Proposed Development when considered in the context of other operational, consented and proposed solar energy developments. Cumulative landscape and visual effects can arise in four reasonably distinctive ways:

- **Simultaneously / in combination**, where two or more solar farms are seen together at the same time from the same viewpoint in the same field of view. The effects of an extension of an existing development or the positioning of a new development such that it would give rise to an extended or/and intensified impression of the original solar farm in the landscape as seen from fixed locations.
- **In succession** – where two or more developments are present in views from the same location but cannot be seen in the same field of view and the observer has to turn to see them;
- **In sequence** – where two or more solar farms are not seen from the same viewpoint, even if the observer turns around to extend his/her perception of the surrounding landscape. The receptor has to move to another location to see cumulative developments. The frequency of occurrence greatly depends on factors like: distance to developments, distance to another viewpoint and speed of travel.
- **Perceived** – where the observer is unable or unwilling to gain a view of another development but is aware of its presence.

5.6.2 Based on the knowledge of the local area it appears that the neighbouring Bryn Henllys Solar Farm to the east is the only cumulative scheme that is relevant for the purpose of this LVIA.

Methodology for Cumulative Assessment

5.6.3 The first step in the cumulative assessment is an initial assessment to ascertain which of the landscape character receptors, representative viewpoints and principal visual receptors have potential to undergo significant cumulative effects as result of the addition of the Proposed Development.

5.6.4 A significant cumulative effect will occur where the addition of the Proposed Development to other existing and proposed solar farms will result in a landscape character / aspect areas or view that is defined by the presence of more than one solar farm and is characterised primarily by solar energy schemes, so that other patterns and components are no longer definitive.

5.6.5 It should be noted that even if the Proposed Development is assessed to have a significant effect on a landscape character receptor or view, it does not necessarily follow that the cumulative effect will also be significant.

5.6.6 As with the assessment of effects of the Proposed Development in isolation, the significance of cumulative effects is determined through a combination of the sensitivity of the landscape receptor or view and the magnitude of change upon it. The sensitivity of landscape receptors and views is the same in the cumulative assessment as in the assessment of the proposed development in isolation. However, the cumulative magnitude of change is assessed in a different way, as described in the methodology section.

5.6.7 In order to identify potentially significant cumulative effects of the Proposed Development this LVIA focuses on those aspect areas, designated areas, and principal visual receptors that were found to undergo significant effect when judged in isolation.

5.6.8 If the Proposed Development will have no effect or a limited effect on these receptors i.e. not significant, there is no potential for it to lead to a significant cumulative effect, in combination with other solar energy schemes.

Effects during construction

5.6.9 The construction of the consented Bryn Henllys Solar Farm and the Proposed Development is likely to be carried out at the same time hence the need to assess cumulative effects of its construction phase.

Discussion on the consented Bryn Henllys Solar Farm

5.6.10 The assessment carried out by LDA Design for the construction stage of the now consented Bryn Henlyss solar installation assumed a 30 week programme. It did not assess effects upon LANDMAP or visual receptors in any detail, with the only entry referring to views from the PRoW that crosses the site and from the National Park to the north. The assessment prepared by LDA Design states that such effects would not be greater than those experienced during the operational phase. Such statement is not conclusive and is further complicated by lack of assessment on LANDMAP aspect areas in the LVIA prepared by LDA Design. Instead it assessed the effects upon the Powys landscape character areas (LCAs). The Powys's own landscape character assessment, however, appears to have

been superseded and is no longer listed on the Council's website as evidence base.

5.6.11 Based on the review of the LVIA for the consented Bryn Henllys Solar Farm it transpires that effects upon landscape character, when judged in isolation, would vary from a low magnitude of change and slight significance locally reducing to negligible and minimal significance for the majority of the host LCA B15 Tawe Valley Slopes.[7] Such conclusion is not informative in the context of this LVIA as the landscape character assessment utilises LANDMAP aspect area and not the now out of date Powys' landscape Character Assessment.

5.6.12 LDA Design has described the southern parts of the Brecon Beacons National Park as coinciding with the Character Area 4 Waterfall Country and Southern Valley based on the Brecon Beacons National Park Landscape Character Assessment. The landscape character of this particular area has been assessed by LDA Design as being of medium sensitivity and subject to medium – low magnitude of change, resulting in moderate significance.

5.6.13 With regards to the more distant parts of the National Park (in the northern part of the study area and identified as Character Area 2 Y Mynydd Du), this was assessed as subject to low magnitude of change and minimal significance locally within the areas of inter-visibility. It is worth reiterating that the sensitivity of this landscape (falling within the National Park) has been assessed by LDA Design as being medium.

5.6.14 The landscape in the southern part of the study area of the consented Bryn Henllys Solar Farm has been described by LDA Design as falling within the LCA 33 Cwm Twrch. This area has been assessed as being of low sensitivity and experiencing medium magnitude of change, and slight significance.

<u>Cumulative landscape character effects of both schemes – construction phase</u>

5.6.15 Notwithstanding the conclusions presented by LDA Design in their assessment it transpires that there would be some localised degree of effects as the area of the construction work would be quite extensive. It is possible that the degree of change experienced within the host LANDMAP aspect areas would increase, albeit temporarily, due to their direct incremental effects. Although the effects of the construction phase of the Proposed Development (when judged in isolation) have not been assessed separately, it is possible to ascertain the effects based on the assessment of its operational phase and established landscape sensitivity for each of the LANDMAP aspect areas. The following conclusions have been drawn:

- BRCKNGL773 Cefn Maw – low cumulative degree of change, resulting in moderate adverse significant effects;
- BRCKNLH101 Ystradowen – negligible neutral degree of change in cumulative terms, negligible neutral effects and not significant;
- BRCKNVS365 Bryn Henllys Open Cast – medium cumulative degree of change with minor to moderate adverse effects, which would not be significant;
- BRCKNHL753 Bryn-henllys – low cumulative degree of change, resulting in minor adverse and not significant effects;
- BRCKNCL847 Brecon Beacons National Park – low cumulative degree of change, resulting in moderate adverse and significant effects locally;

[7] Terminology used in the LDA Design's report.

5.6.16 In addition, it is likely that a temporary degree of change would be experienced from the nearby elevated areas to the north and south. This is due to the introduction of movement and activities in the otherwise relatively quiet and static landscape. It is likely, however, that the cumulative degree of change would be negligible to low due to the distance, limited influence over the perception of these landscapes, and screening. This would only relate to the Visual & Sensory aspect areas, of which the most relevant (based on the previous assessments) would include:

- BRCKNVS118 Dorwen ar Gledd – localised low degree of change in cumulative terms but negligible for the whole of this aspect area, thus moderate adverse and significant effects locally. However, effects upon the whole of this aspect area would be negligible neutral;
- CRMRTVS008 Black Mountain south eastern fringes– negligible neutral degree of change in cumulative terms, negligible neutral effects and not significant;
- CRMRTVS016 The Black Mountain– negligible neutral degree of change in cumulative terms, negligible neutral effects and not significant;
- NPTVS344 Cwm Twrch– low adverse cumulative degree of change, with the temporary effects being minor to moderate and not significant;

Cumulative visual effects of both schemes – construction phase

5.6.17 With regard to cumulative visual effects the majority of identified receptors would be screened from both or one of the cumulative schemes. Views towards the Application Site are limited, as confirmed by the site visit albeit the visibility of the consented Bryn Henllys Solar Farm is likely to be higher. In cumulate terms this means that the addition of the Proposed Development is unlikely to significantly add to the cumulative visual effects, due limited visual influence.

5.6.18 The three viewpoints that have been assessed as subject to significant effects, as a result of the introduction of the Proposed Development and when judged in isolation, have been reviewed to ascertain the level of cumulative effects. The view of additional areas under construction, movement and change to the character of the landscape would result in some perceptible change as detailed below:

- Viewpoint 1 – medium magnitude of change and temporary major significant cumulative effects;
- Viewpoint 3 – medium magnitude of change and temporary major significant cumulative effects; and
- Viewpoint 4 – medium magnitude of change resulting in temporary major significant cumulative effects;

5.6.19 In addition, the PRoW associated with Viewpoint 1, and those that skirt both developments would be subject to significant temporary visual effects. The proximity to the construction site, movement, and change in the visual context would be unavoidable and difficult to control at this stage.

Effects during operational phase – Analysis of paired ZTVs

5.6.20 A cumulative ZTV is used to represent the extent of visibility of the Proposed Development in relation to the consented Bryn Henllys Solar Farm (**Figure 5.11**). The overall pattern of visibility reflects the local topography and close proximity of both developments, and the additionality of the Proposed Development is very limited.

5.6.21 The paired ZTV has been used during the assessment of cumulative effects upon the Visual & Sensory aspect areas in order to establish which areas are likely to experience visibility, at what level and configuration.

Effects during operational phase - Assessment of cumulative effects on landscape receptors

5.6.22 The assessment of cumulative effects on aspect areas uses the same receptors as the assessment of effects on aspect areas carried out previously in this LVIA. It is divided into:

- Assessment of aspect areas / landscape character assessment – limited to the Visual & Sensory Layer;
- Assessment of designated areas.

Effects during operational phase - Assessment of cumulative effects on Visual & Sensory layer

5.6.23 There is no cumulative scoping process developed by Natural Resources Wales similar to the one described in the LANDMAP Guidance Note 3. Only aspect areas of the Visual & Sensory Layer were considered relevant as they focus on the sensory and perceptual qualities of the landscape. In order to follow a similar and consistent assessment it was judged that the cumulative assessment upon the Visual & Sensory aspect areas should be carried out within 5 kilometres, as only within this area any potentially significant effects may occur. Therefore, following a similar approach and the methodology outlined above, it was judged that those aspect areas that have been assessed a subject to significant effects will be taken forward. Out of the identified and assessed aspect areas only the BRCKNVS118 Dorwen ar Gledd is relevant for the purpose of this cumulative landscape character assessment.

5.6.24 In landscape character terms, the presence of the consented Bryn Henllys Solar Farm would exert some influence over the character of this landscape. The cumulative ZTV for both schemes considerably overlaps, which means that any potential additional change upon the perpetual and sensory qualities of the landscape of the BRCKNVS118 Dorwen ar Gledd would be very limited with a solar farm already present in the adjacent aspect area. On that basis, the additionality of the Proposed Development would bring about a medium magnitude of change, resulting in minor to moderate not significant effects upon the whole of the aspect area. This takes into account the mitigation measures associated with the consented scheme.

Effects during operational phase - Assessment of cumulative effects on designated areas

5.6.25 It is unlikely that the Brecon Beacons National Park would undergo significant cumulative effects, due to the very limited inter-visibility with the Proposed Development and the effectiveness of the proposed mitigation measures. The overall landscape character of the Brecon Beacons National Park and its perception has been assessed as subject to negligible not significant effects. It therefore follows that with the consented Bryn Henllys Solar Farm being present the additionality of the Proposed Development would not have any significant effects. This conclusion is supported by the photoviews for Viewpoints 6 – 9 (**Figure 5.8**) where the Application Site is largely screened.

Effects during operational phase - Assessment of cumulative effects on viewpoints

5.6.26 Only two types of cumulative effects are applicable to this assessment of static viewpoints: *'in combination/simultaneously'* and *'in succession'*. The assessment of the Proposed Development, when judged in isolation, concluded that only three out of ten viewpoints may have the potential to be significantly affected and Photomontages providing an in combination view of the developments is provided at **Figure 5.12**. It has been considered prudent therefore to re-asses these three viewpoints in order to establish the potential for significant cumulative visual effects:

- Viewpoint 1;
- Viewpoint 3; and
- Viewpoint 4.

Viewpoint 1: View from public footpath, Brecon Beacons National Park, north-east of Application Site

Figure 5.8 and 5.10

5.6.27 The users associated with Viewpoint 1 have been judged to be subject to potentially significant cumulative visual effects. The prolonged views and the extent of solar panels either side of the footpath were considered an issue at the design stage and this has been addressed through mitigation measures. The mitigation measures associated with the consented Bryn Henllys Solar Farm include hedgerow planting along its northern boundary and modest areas of woodland planting in corners of some of the fields. The layout, however, suggests that views from the north will not be entirely screened. Following the implementation of the proposed planting for the consented scheme, and once the planting has established after approx. 5 years, the additionality of the Proposed Development is likely to result in a low cumulative magnitude of change. This would result in moderate adverse and significant effects at Year 5. This is likely to reduce to negligible neutral and not significant effects around Year 8-10 due to the increase in vegetative screening with detracting features in the background landscape continuing to exert strong influence.

Viewpoint 3: Open Access Land west of Pen-Rhiw-fawr on Gwrhyd Road, south-west of Application Site

Figure 5.8 and 5.10

5.6.28 The receptors at this location would overlook the valley landscape and the consented Bryn Henllys Solar Farm would be clearly perceptible . The addition of the Proposed Development would extent the presence of solar energy schemes in the view but would be physically curtailed by the existing landscape framework. The proposed mitigation measures, namely the northern belt of tress would create a strong visual and physical separation. It would create a clear segregation from the empty and treeless landscape of the National Park. The Proposed Development would read as part of the upper slopes of the valley landscape and not the National Park landscape. It is considered that the addition of the Proposed Development would bring about a low cumulative magnitude of change, resulting in moderate significant cumulative visual effects.

Viewpoint 4: Coedffaldau north-west of Pen Rhiw Fawr, south-west of Application Site

Figure 5.8, 5.9 and 5.10

5.6.29 As assessed above the additionality of the Proposed Development, assuming the consented Bryn Henllys Solar Farm and its mitigation planting is in place, would result in a low cumulative magnitude of change. This would bring about moderate significant cumulative visual effects.

Effects during operational phase - Assessment of cumulative effects on visual receptors

5.6.30 It is predicted that there will be no significant cumulative effects upon the majority of the visual receptors within the study area. None of the road receptors, SUSTRANS cycle route, or specific PRoWs, have been shortlisted for a detailed assessment. The assessment of viewpoints, when considering the Proposed Development in isolation, concluded that only three out of ten identified viewpoints are subject to significant effects. Out of these, only the users of the PRoWs associated with Viewpoint 1 (**Figure 5.8**) and those that skirt the two solar energy schemes would be subject to moderate significant visual effects. Following the implementation and establishment of mitigation measures for both schemes the residual effects would reduce to not significant. Views of the solar schemes would be considerably restricted and glimpsed. The proposed mitigation measures will establish a new line of hedgerow and tree vegetation that will create a strong separation between the solar schemes and the surrounding landscape thus protecting the amenity of the visual receptors.

5.7 SUMMARY

Introduction

5.7.1 This LVIA has assessed the likely significant effects of the Proposed Development upon the receiving environment: landscape elements associated with the Application Site, LANDMAP aspect areas, landscape designations, and visual receptors.

Assessment Approach

5.7.2 The assessment has been carried out with regards to the following key guidance:

- Guidelines for Landscape and Visual Impact Assessment. Third Edition, Landscape Institute and the Institute for Environmental Management and Assessment (GLVIA3);
- LANDMAP Methodology 2016 for each of the five layers.

5.7.3 The information provided in the LANDMAP Guidance Note 3 have also been used to identify the potentially significantly affected LANDMAP aspect areas.

5.7.4 The consultation with Powys County Council has been carried out through the Scoping Report, and the viewpoint selection reflects the viewpoints selected for the neighbouring consented Bryn Henllys Solar Farm to allow comparison and assessment of cumulative effects.

5.7.5 Photographs and site visit were carried out in June 2019 when trees and hedgerows were in leaf and vegetative screening present. Where relevant this has been taken into account during the assessment of potential effects.

Baseline Conditions

5.7.6 The site visit has helped to ascertain the condition of the landscape elements associated with the Application Site, and level of inter-visibility with the surrounding landscapes and potential visual receptors.

5.7.7 Planning policies and published documents in relation to solar energy schemes and landscape sensitivity have been reviewed. The published landscape character assessments, description for the relevant LANDMAP aspect areas, and the Brecon Beacons National Park Management Plan have also been used to help inform this LVIA.

Assessment of Likely Significant Effects

Operational Phase

5.7.8 The assessment of the LANDMAP aspect areas has concluded that the following aspect areas are likely to be subject to significant effects upon their character:

- Visual & Sensory Layer: BRCKNVS118 Dorwen ar Gledd;
- Historic Landscape Layer: BRCKNHL595 Mynydd Du;
- Cultural Landscape Layer: BRCKNCL847 Brecon Beacons National Park.

5.7.9 It is worth reiterating that the significant effects would be only experienced locally, on the periphery of these aspect areas, where views of the Proposed Development might change the appreciation of these particular aspect areas. The significant effects would not apply to the whole of the aspect areas.

5.7.10 With regard to the Brecon Beacons National Park it transpired that its landscape character would be subject to some localised moderate significant effects. These would relate to the Landscape Character Area (LCA) 4 Waterfall Country and Southern Valleys and LCA 2 Y Mynydd Du. These two LCAs coincide with the LANDMAP aspect areas which have been assessed as experiencing negligible neutral and not significant effects with localised moderate significant effects within approximately 1km radii of the Proposed Development. Such significant effects would therefor occur only on the periphery of the LCA 4 Waterfall Country and Southern Valleys and LCA 2 Y Mynydd Du. The overall landscape character of the Brecon Beacons National Park and its perception would not be changed or redefined. With regard to the National Park's Special Qualities, these would not be redefined or significantly affected.

5.7.11 With regards to viewpoint assessment only three out of ten identified viewpoints have been assessed are subject to significant effects:

- Viewpoint 1;
- Viewpoint 3; and
- Viewpoint 4.

5.7.12 In addition, the PRoW which skirts the Application Site to the east would, be subject to significant effects. With regard to the receptors travelling along the various PRoWs and Open Access Land to the south west and south, these are likely to be subject to moderate adverse and significant effects where the visibility of the Proposed Development is more frequent. Such effects, however, are the result of high sensitivity of the receptors rather than the magnitude of change.

Mitigation and Enhancement

5.7.13 A number of mitigation measures have been implemented during the iterative design stage and these relate to the protection of boundary vegetation, location and alignment of access tracks, location of ancillary infrastructure such as substations and transformers but also the location of the construction compound.

5.7.14 In addition, a positive management of existing hedgerows and new woodland planting has been included to reduce the visual effects and reduce the potential change upon the landscape character and visual amenity of the nearby receptors. The new woodland planting has been proposed along the northern with additional hedgerow planting along the eastern boundaries of the northern parcel, and southern boundary of the southern parcel.

5.7.15 Following the successful implementation and establishment of the proposed planting it has been concluded that none of the LANDMAP aspect areas would experience significant landscape character effects

5.7.16 With regards to static views, the residual effects upon the receptors at Viewpoint 1, Viewpoint 3, and Viewpoint 4 would remain significant during the first 5-8 years. After that period the residual effects for Viewpoint 1 are likely to diminish to negligible. This takes into account the existing context, presence of wind farms and open cast mine in the view. The residual effects for the remaining Viewpoints 3 and 4 would not change.

5.7.17 With regard to the low lying section of the public footpath associated with Viewpoint 1, along the eastern boundary of the Application Site, the residual effects are likely to be negligible. The residual effects for other more elevated sections of PRoW, however, would remain significant.

5.7.18 In order to provide for additional enhancement, it has been recommended in this LVIA that the existing improved pastures would be replaced by species rich grassland maintained for biodiversity.

Cumulative and In-combination Effects

Construction and Decommissioning Phases

5.7.19 Landscape character and visual effects are likely to be similar or identical during the construction and decommissioning phases, thus are discussed together.

5.7.20 The assessment of the LANDMAP aspect areas has concluded that the following aspect areas are likely to be subject to significant effects upon their character during the construction phase:

- BRCKNGL773 Cefn Maw – low cumulative degree of change, resulting in moderate adverse significant effects;
- BRCKNCL847 Brecon Beacons National Park – low cumulative degree of change, resulting in moderate adverse and significant effects locally; and
- BRCKNVS118 Dorwen ar Gledd – localised low degree of change in cumulative terms but negligible for the whole of this aspect area, thus moderate adverse and significant effects locally. However, effects upon the whole of this aspect area would be negligible neutral;

5.7.21 With regard to cumulative visual effects during the construction phase, the majority of the identified receptors would be screened from both or one of the cumulative schemes.

5.7.22 Three viewpoints, however, have been assessed as subject to significant cumulative effects due to the additional areas under construction, construction traffic, and change to the character of the landscape:

- Viewpoint 1 – medium magnitude of change and temporary major significant cumulative effects;
- Viewpoint 3 – medium magnitude of change and temporary major significant cumulative effects; and
- Viewpoint 4 – medium magnitude of change resulting in temporary major significant cumulative effects;

5.7.23 In addition, the PRoW associated with Viewpoint 1, and those that skirt both developments would be subject to significant temporary visual effects. The proximity to the construction site, movement, and change in the visual context would be unavoidable and difficult to control at this stage.

Operational Phase

5.7.24 None of the landscape receptors: aspect areas and the Brecon Beacons National Park have been assessed as subject to significant cumulative effects during the operational stage of the Proposed Development.

5.7.25 With regards to visual amenity only receptors at Viewpoints 1, 3 and 4, have been assessed as subject to significant cumulative effects. The residual cumulative effects at all three viewpoints would remain moderate and significant at Year 5. It is likely that due to the increasing vegetative screening the effects at Viewpoint 1 would diminish to negligible and not significant at Year 8 – 10.

Conclusion

5.7.26 This LVIA has been carried out with regards to the best practice and techniques for the landscape character assessment and LANDMAP aspect area. The assessment has taken into account the existing context, potential change to the receiving landscape and influence on the visual amenity of the identified receptors. The assessment has concluded that there would be some localised significant effects but in majority of cases these can be mitigated, including the cumulative effects. Overall, the Proposed Development has been considered as responding well to the characteristic of the receiving environment, mitigating visual effects, whilst not compromising the requirements and technical aspects of this solar energy scheme.

Table 5.8: Summary of Effects, Mitigation and Residual Effects.

Receptor / Receiving Environment	Description of Effect	Nature of Effect *	Sensitivity Value **	Magnitude of Effect **	Geographical Importance ***	Significance of Effects ****	Mitigation / Enhancement Measures	Residual Effects ****
Construction								
Users of adjacent PRoWs / Viewpoint 1	Visibility of construction work, movement, change in land use.	Temporary / Indirect	High	High	Local	Major	Mitigation in Design	Major Adverse
Operation								
Visual & Sensory Layer: BRCKNVS118 Dorwen ar Gledd	Perceptual change to the appreciation of the landscape of this aspect area.	Permanent / Indirect	High	Low	Local	Moderate	Hedgerow maintenance and woodland planting.	Negligible
Historic Landscape Layer: BRCKNHL595 Mynydd Du	Perceptual change to the appreciation of the landscape of this aspect area.	Permanent / Indirect	High	Low	Local	Moderate	Hedgerow maintenance and woodland planting.	Negligible
Cultural Landscape Layer: BRCKNCL847 Brecon Beacons National Park	Perceptual change to the appreciation of the landscape of this aspect area.	Permanent / Indirect	High	Low	Local	Moderate	Hedgerow maintenance and woodland planting.	Negligible
Brecon Beacons National Park	Perceptual change to the appreciation of the landscape of this aspect area.	Permanent / Indirect	High	Low	Local	Moderate	Hedgerow maintenance and woodland planting.	Negligible
Users of nearby	Perceptual change	Permanent /	High	Low	Local	Moderate	Hedgerow	Negligible

PRoWs adjacent to the Proposed Development	to the appreciation of the landscape of this aspect area.	Indirect					maintenance and woodland planting.	to Moderate Adverse
Viewpoint 1: View from public footpath, Brecon Beacons National Park, north-east of Application Site	Perceptual change to the appreciation of the landscape of this aspect area, new type of infrastructure and element in the view.	Permanent / Indirect	High	Medium	Local	Major	Hedgerow maintenance and woodland planting.	Moderate Adverse
Viewpoint 3: Open Access Land west of Pen-Rhiw-fawr on Gwrhyd Road, south-west of Application Site	Perceptual change to the appreciation of the landscape of this aspect area, new type of infrastructure and element in the view.	Permanent / Indirect	High	Low	Local	Moderate	Hedgerow maintenance and woodland planting.	Moderate Adverse
Viewpoint 4: Coedffaldau north-west of Pen Rhiw Fawr, south-west of Application Site	Perceptual change to the appreciation of the landscape of this aspect area, new type of infrastructure and element in the view.	Permanent / Indirect	High	Low	Local	Moderate	Hedgerow maintenance and woodland planting.	Moderate Adverse
Cumulative and In-combination Construction / Decommissioning								
Geological Layer: BRCKNGL773 Cefn Maw	Perceptual change to the appreciation of the landscape of this aspect area.	Temporary / Indirect	High	Low	Local	Moderate	N/A	N/A
Cultural Landscape Layer: BRCKNCL847	Perceptual change to the appreciation of the landscape of	Temporary / Indirect	High	Low	Local	Moderate	N/A	N/A

Brecon Beacons National Park	this aspect area.							
Visual & Sensory Layer: BRCKNVS118 Dorwen ar Gledd	Perceptual change to the appreciation of the landscape of this aspect area.	Temporary / Indirect	High	Low	Local	Moderate	N/A	N/A
Viewpoint 1: View from public footpath, Brecon Beacons National Park, north-east of Application Site	Perceptual change to the appreciation of the landscape of this aspect area, new type of infrastructure and element in the view.	Temporary / Indirect	High	Medium	Local	Major	N/A	N/A
Viewpoint 3: Open Access Land west of Pen-Rhiw-fawr on Gwrhyd Road, south-west of Application Site	Perceptual change to the appreciation of the landscape of this aspect area, new type of infrastructure and element in the view.	Temporary / Indirect	High	Medium	Local	Major	N/A	N/A
Viewpoint 4: Coedffaldau north-west of Pen Rhiw Fawr, south-west of Application Site	Perceptual change to the appreciation of the landscape of this aspect area, new type of infrastructure and element in the view.	Temporary / Indirect	High	Medium	Local	Major	N/A	N/A
Cumulative and In-combination Operation								
Viewpoint 1: View from public footpath,	Increase in extent of solar energy scheme across the	Permanent / Indirect	High	Low	Local	Moderate	-	Moderate Adverse

Brecon Beacons National Park, north-east of Application Site	view.							
Viewpoint 3: Open Access Land west of Pen-Rhiw-fawr on Gwrhyd Road, south-west of Application Site	Increase in extent of solar energy scheme across the view.	Permanent / Indirect	High	Low	Local	Moderate	-	Moderate Adverse
Viewpoint 4: Coedffaldau north-west of Pen Rhiw Fawr, south-west of Application Site	Increase in extent of solar energy scheme across the view.	Permanent / Indirect	High	Low	Local	Moderate	-	Moderate Adverse

6 BIODIVERSITY

6.1 INTRODUCTION

6.1.1 This Chapter provides an assessment of the likely significant effects of the Proposed Development on biodiversity.

6.1.2 Information has been compiled from a desk study, an Extended Phase 1 habitat survey and a breeding bird survey, enabling the determination of the likely ecological effects of the Proposed Development.

6.1.3 This assessment establishes the likely presence or likely absence of protected or notable species, identifies statutory and non-statutory designated sites for nature conservation in the vicinity of the Proposed Development and evaluates the overall conservation status of the Application Site. The potential for the Proposed Development to have an effect on designated sites and protected and notable species is discussed along with proposed mitigation measures where applicable. Opportunities for biodiversity enhancement are also outlined.

6.2 ASSESSMENT APPROACH

Methodology

6.2.1 This Chapter provides an assessment of the ecological effects of the Proposed Development in the context of wildlife and countryside legislation, and applicable national and local planning policy. It has been undertaken with reference to the Chartered Institute of Ecology and Environmental Management (CIEEM) (2018)1 guidance and focuses on those activities that could potentially generate significant effects on ecological features. The assessment methodology also reflects the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (as amended).

Zone(s) of Influence

6.2.2 Zones of influence (the areas over which ecological features may be affected or require consideration) have been identified in relation to the Proposed Development, with reference to CIEEM (2018) and current government guidance2 including Planning Policy Wales (2018) and Technical Advice Note 5 Nature Conservation and Planning (2009). An initial review of ecological features, together with a review of the likely activities associated with the Proposed Development and Natural Resources Wales (NRW)'s consultee response was used to identify zones of influence for the assessment. Within this, study areas were identified for the desk study and field survey required to inform the valuation of ecological features and the selection of important ecological features scoped in to the assessment. The zones of influence vary in accordance with the typical distribution and movements of individual species and the likely mobility of qualifying interests of statutory designated sites. The ZOIs adopted for the Application Site, can be summarised as:

[1] Chartered Institute of Ecology and Environmental Management Guidelines for Ecological Impact Assessment I the UK and Ireland, Terrestrial, Freshwater, Coastal and Marine. CIEEM (2018).

[2] https://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/advice-for-developers/protected-species/?lang=en; https://gov.wales/technical-advice-note-tan-5-nature-conservation-and-planning; https://gov.wales/sites/default/files/publications/2018-12/planning-policy-wales-edition-10.pdf

- Desk study - statutory designated sites within 5kmof the Application Site, extended to 10km for European Sites (Special Protection Areas (SPAs) or Special Areas of Conservation (SACs) and including Ramsar sites);
- Desk study - non-statutory designated sites, protected and notable habitats and species (e.g. Section 7 of the Environment (Wales) Act 2016, Species of Principal Importance and Priority Habitats) within 2km;
- Field survey habitats - land within Application Site and immediately surrounding land (where this could be surveyed from publicly accessible land or with third party permission). The surrounding land was surveyed so as to apply appropriate context and value to habitats identified within the Application Site;
- Field survey badgers – Application Site and adjacent land within at least 30m in accordance with current guidance , where access permitted.

Feature Importance

6.2.3 Reference was made to documents listed in the Policy Context section of this document in order to assess the findings of baseline surveys against known assessment criteria. Where uncertainties exist, professional judgment has been used to inform the ecological assessment and this has been highlighted in the text.

6.2.4 In order to determine the baseline conditions present at, and in the vicinity of, the Application Site in relation to species and habitats and to allow determination of important ecological features, a data gathering exercise was initiated as outlined below.

Data Gathering

Desk study

6.2.5 The following data sources have been used in the compilation of this assessment:

- The Biodiversity Information Service (BIS) was contacted to obtain records of protected and priority species, species of local and national conservation concern and non-statutory designated sites of nature conservation interest from within a 2km radius of the Application Site boundary.
- The Multi-Agency Geographic Information for the Countryside (MAGIC)3, Joint Nature Conservation Committee (JNCC) and Natural Resources Wales (NRW) websites to obtain information on statutory sites from within a 5km radius of the Site boundary (extended to 10km for SPAs);
- Review of the Powys Local Development Plan (2011-2026)4.
- Reference was also made to Ordnance Survey maps of the wider area using on-line aerial images (www.google.co.uk/maps) in order to determine any features of nature conservation interest in the surrounding landscape.

Field Survey Methodologies

6.2.6 The following section summarises field surveys carried out to inform the ecology assessment.

Extended Phase 1 Habitat Survey

[3] http://www.magic.defra.gov.uk

[4] https://en.powys.gov.uk/article/4898/Adopted-LDP-2018 (accessed 18/06/2019)

6.2.7 An Extended Phase 1 habitat survey of the Application Site was undertaken on the 14th June 2019 by an experienced Ecologist.

6.2.8 The survey methodology employed was based-upon that outlined in the 'Handbook for Phase 1 Habitat Survey - a Technique for Environmental Audit', JNCC (2010), whereby all habitats within the Application Site are mapped and described using a series of 'target notes' (TNs) to provide an overview of the Application Site and immediately adjacent land. This habitat survey method was extended through the additional recording of specific features indicating the presence, or likely presence, of protected species and other species of conservation significance.

Breeding Bird Survey

6.2.9 A Breeding Bird Survey (BBS) was undertaken on the 14th June 2019 by Mr C Davies MSc. The methodology employed was based-upon a scaled-down version of the British Trust for Ornithology (BTO) Common Bird Census (CBC) technique, as detailed in Gilbert et al. (1998). This involved walking the survey area and recording all species and behaviours indicative of breeding, in order to enable an estimation of the number of breeding bird territories present. The BBS survey area is defined here as all land within the Application Site boundaries.

6.2.10 During the survey visit a pre-determined route was walked through the survey area and all birds seen or heard, and their behaviours (e.g. singing, carrying food etc.) were mapped in the field. The survey was undertaken during daylight hours and in warm conditions with no wind; however some rain showers occurred during the survey period.

Consultations

6.2.11 **Table 6.1** details consultations with Natural Resources Wales which formed an ongoing part of the ecological scoping and impact assessment, with responses used to inform the processes throughout. Table 6.1 summarises the response from 1st August 2019 on ecology and biodiversity and provides a commentary on how these have been addressed as part of the ecological impact assessment.

Table 6.1 Consultation Responses on Biodiversity & Ecology

Consultee comment (NRW)	**How addressed as part of the Ecological impact assessment**
NRW have a number of historic records of protected species (otter, bats, water vole) near the site but do not currently have any records of protected species within the boundary of the proposed development site.	A desk study has been undertaken including a local records search for protected species through BIS and results are provided in Section 6.3. The findings have then been used to assess impacts later in the Chapter.
We agree with the scope of the biodiversity section of the report stating a Phase 1 Habitat Survey will be carried out first and the results of this will inform the requirements for additional species-specific surveys.	Project timeframes allowed for one breeding bird survey prior to submission which was undertaken at the same time as the extended Phase 1 habitat survey. Results of the habitat survey can be found in Section 6.3. No further species-specific surveys were considered necessary to inform the assessment, as detailed in this Chapter.
We advise that attention is given to	The potential for the presence of and

Consultee comment (NRW)	How addressed as part of the Ecological impact assessment
the potential for drainage channels and other water bodies to host water voles. We hold an historic record for this species within 700m to the south.	impacts upon water voles (and otter) is addressed in Section 6.3. The survey found one dry ditch within the Site which holds negligible potential for water voles. The Afon Twrch and other waterbodies in the wider survey area are situated over 5m away. In line with current guidance, the assessment shows that the development will not impact on water voles if present in local watercourses.
Consideration must also be given to any likely impact on European Protected Species, such as otter and bats, which are likely to use the nearby Afon Twrch, adjacent woodland hedgerows and nearby water bodies for foraging, commuting and as a place of shelter.	The potential for the presence of and impacts upon these species are considered in Section 6.3. None of these habitats will be directly affected by the proposed development. The potential for temporary and indirect effects during construction on nearby habitats and associated species are considered in Section 6.4.
Consideration to disturbance associated with the construction phase, the impact of security lighting, as well as restrictions to wildlife movements during the operational phase must be clearly addressed within the ecological submissions.	The effects of the construction phase are considered in Section 6.4 with reference to security lighting and commuting pathways for each relevant species. Good practice avoidance, protection and mitigation measures are considered in Section 6.5.
The biodiversity section also needs to demonstrate that it has considered the potential impact that the development may have on any relevant protected sites.	The potential for the proposed development to affect designated sites has been considered in Section 6.3.

Assessment of Effects

6.2.12 Ecological Impact Assessment (EcIA) is defined within the CIEEM guidelines as:

> **"a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems'."**

6.2.13 The EIA Regulations requires a description of the 'likely significant effects of the proposed development on the environment' (Regulation 17(3)(b)).

6.2.14 This Chapter includes:

- An evaluation of identified important ecological features and potential features; faunal species, habitats and vegetation (as appropriate) on an international, national and regional basis;
- A description and evaluation of the potential effects of the Proposed Development on statutory and non-statutory sites designated for nature conservation;

- A description and evaluation of the potential effects of the Proposed Development on species and habitats.
- Mitigation measures to address any identified significant adverse effects;
- Identification of any residual effects after mitigation; and
- Identification of opportunities for biodiversity enhancements.

6.2.15 The assessment has been carried out in accordance with CIEEM guidelines with a detailed methodology provides at **Appendix 6.1**.

Legislation and Policy Framework

6.2.16 Reference has been made to the following key pieces of legislation, planning policy and guidance:

Table 6.2 Legislation and Policy

European
Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (hereafter referred to as the 'Habitats Directive'); and, Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (codified version of Directive 79/409/EEC as amended) (hereafter referred to as the 'Birds Directive').
National
The Conservation of Habitats and Species Regulations 2010, as amended (hereafter referred to as the 'Habitat Regulations'); The Wildlife and Countryside Act 1981 (as amended); Environment (Wales) Act 2016 Countryside and Rights of Way Act 2000; Protection of Badgers Act 1992; Hedgerow Regulations 1997 Planning Policy Wales 2018 'Birds of Conservation Concern 4' (Eaton *et al*., 2015)[5]; The United Kingdom Biodiversity Action Plan (UK BAP); The Bat Conservation Trust - *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Ed.).* (Collins *et al.*, 2016[6]); and BS 42020:2013 Biodiversity – Code of Practice for Planning and Development. TAN5: Nature Conservation and Planning (2009)
Local

[5] Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D,. Stroud, D. and Gregory, R (2015). Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. *British Birds*, 108, pp708-746.

[6] Collins *et al.* (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines*. 3rd edition, BCT: London

The Our Partnership with Nature; A Local Biodiversity Action Plan for Powys (LBAP)[7]

The 'UK Post-2010 Biodiversity Framework'[8] succeeds the UK Biodiversity Action Plan (UK BAP) and 'Conserving Biodiversity – the UK Approach'. The lists of priority species and habitats agreed under UK BAP still form the basis of much biodiversity work and are therefore considered within this report in the context of the objectives of the Biodiversity Framework. BAPs identify habitats and species of nature conservation priority on a UK (UK BAP) and Local (LBAP) scale. UK BAPs are now largely superseded but formed the basis for statutory lists of priority species and habitats in Wales listed under Section 7 of the Environment (Wales) Act 2016.

Policy and Guidance

6.2.17 The Adopted Powys Local Development Plan 2011-20269 sets out the region-wide strategic development policies. Within the Development Plan, Policy DM2: The Natural Environment, includes reference to the protection of features of nature conservation interests, designated sites protected habitats and species as well as biodiversity requirements.

6.2.18 The Our Partnership with Nature; A Local Biodiversity Action Plan for Powys (LBAP)[10] lists 17 priority habitats and 28 species/species groups.

6.2.19 Species-specific survey guidance were used to design appropriate survey strategies and to determine the features to be surveyed. These are discussed further in the methodology section.

Scoping Criteria

6.2.20 The scope of the assessment includes a desk study, an Extended Phase 1 habitat survey and breeding bird survey. These elements were carried out to establish potential effects on statutory designated and non-statutory designated sites, habitats and protected and priority species.

Limitations to the Assessment

6.2.21 Project timeframes allowed for one breeding bird survey prior to submission and due to local weather conditions, some light rain occurred during the survey although conditions were otherwise warm and still and suitable for bird survey. It is considered that the range of species was recorded that represented a typical assemblage of species frequently recorded nesting in the farmland and hedgerow habitats within the Application Site.

6.2.22 Ponds located within 250m of the Application Site on third party land were not accessed. However, these will not directly impacted by the works. Any existing and available data sources are referenced within the assessment.

6.3 BASELINE CONDITIONS

6.3.1 This section describes baseline conditions present across the Application Site based on field surveys undertaken in 2019 and are illustrated in the following Figures. Where relevant these are divided into two separate Maps (Map 1 and Map 2) to cover the northern and southern extents of the Application Site:

- **Figure 6.1 (a and b)**: Extended Phase 1 Habitat Survey (Map 1 and 2)

[7] https://en.powys.gov.uk/article/2553/Local-Biodiversity-Action-Plan
[8] http://jncc.defra.gov.uk/page-6583
[9] https://en.powys.gov.uk/article/4898/Adopted-LDP-2018
[10] https://en.powys.gov.uk/article/2553/Local-Biodiversity-Action-Plan

- **Figure 6.2**: Statutory Designated Sites
- **Figure 6.3**: Non-Statutory Designated Sites
- **Figure 6.4 (a and b)**: Breeding Bird Survey (Map 1 and 2)
- **Figure 6.5**: Pond Location Plan

6.3.2 The Application Site comprises of two parcels of land with a narrow linear link between the two, forming a combined area of approximately 25.59ha. It is located to the north-east of the village of Ystradowen with the town of Ystradgynlais located approximately 3.4km to the south-east. The Afon Twrch runs approximately 120m to the west.

6.3.3 The two land parcels contain 9 fields mainly comprising improved grassland for silage, and with hedgerows along the boundaries. A small area of semi-natural broad-leaved woodland is located to the east of the southernmost parcel within the Application Site (See **Figure 6.1 b**). Woodland is also located outside the Application Site, on the southern boundary of the first northern-most parcel and the eastern and northern boundaries of the southern land parcel.

6.3.4 Habitats surrounding the Application Site in the wider area include further areas of arable and improved grassland, woodland, a dry ditchand hedgerows.

Statutory and Non-Statutory Designated Sites

Statutory Designated Site Baseline

6.3.5 A review of the MAGIC website[11] confirms that the Application Site does not form part of any statutory or non-statutory designated site for nature conservation. The nearest statutory designated site is Cwm Twrch Site of Special Scientific Interest (SSSI) located 140m to the west which is designated for its geological interests only. The remaining five statutory protected sites are located over 2km from the Application Site. There are no designated sites of European interests designated for their mobile qualifying interests (e.g. birds or bats) within 10km of the Application Site.

6.3.6 The desk study identified six statutory designated sites within 5km of the Application Site boundary. These are detailed in **Table 6.3** in order of proximity. The locations of all statutory designated sites located within 5km (extended to 10 km for internationally designated sites with mobile qualifying interest species such as birds and bats) of the Application Site boundary are provided in **Figure 6.2**.

Table 6.3: Statutory designated sites

Site Name	Distance	Reason for designation
Cwm twrch SSSI	140m west	Geological conservation site.
Rhos hen-glyn-isaf SSSI	2.2km east	An extensive and varied area of damp/wet heathy pasture above the valley of the River Giedd, near Ystradgynlais. It is noted for its wide variety of plant species, including several that are uncommon in

[11] http://www.magic.gov.uk

Site Name	Distance	Reason for designation
		Brecknock.
Mynydd Du (Black Mountain) SSSI	3.2km north	Designated for its calcareous grassland, flush, spring and dry heath habitats.
Tairgwaith SSSI	3.5km west	Contains nationally important grassland
Gwrhyd meadows SSSI	4.2km south-west	An extensive area of meadows, wet pastures and traditionally managed grasslands.
Cefn gwrhyd, Rhydyfro SSSI	4.7km south-west	Important grassland.

Non-statutory Designated Site Baseline

6.3.7 The Biodiversity Information Service (BIS) provided information for six Sites of Importance for Nature Conservation (SINCs) within a 2km radius of the Application Site boundary. These are presented in order of proximity within **Table 6.4** and their locations provided in **Figure 6.3**.

Table 6.4: Non-statutory designated sites within 2km.

Site Name	Distance	Reason for designation
Pant-y-Brwyn SINC	500m west	No information provided
Tiroedd Comin Cwm Amman Uchaf SINC	1.0km west	No information provided
Land behind Pen y Bryn SINC	1.3km west	No information provided
Behind Heol y Coedcau SINC	1.3km west	No information provided
Parc Rhiwfawr SINC	1.6km south-west	No information provided
Burnet Field, Harris Road SINC	1.6km west	No information provided

Habitats of Principal Importance

6.3.8 One habitat of Principal Importance; marshy grassland listed in Section 7 of the Environment (Wales) Act 2016 was shown as present within the Application Site boundaries from records received from Biodiversity Information Service (BIS).

6.3.9 Two habitats designated as Habitats of Principle Importance by Natural Resource Wales (NRW) are located within 2km of the Application Site; Heathland and grassland 1.2km east at its closest point and Woodlands - Planted ancient woodland (6 separate areas) approximately 0.9km south-east of the Application Site at their closest point.

Habitats

6.3.10 Habitats identified within the Application Site from the Extended Phase 1 habitat survey are presented in **Figure 6.1**. Specific points of ecological interest are identified and recorded using Target Notes (TNs), presented in **Table 6.5**

6.3.11 The dominant habitat type within the Application Site is improved grassland, likely cropped for silage. The improved grassland fields are species-poor with species present including perennial rye-grass *Lolium perenne*, Yorkshire fog *Holcus lanatus*, cock's-foot *Dactylis glomerata*, Timothy *Phleum pratense*, creeping bent-grass *Agrostis stolonifera*, common mouse-ear *Cerastium fontanum*, creeping buttercup *Ranunculus repens* and heath speedwell *Veronica officinalis*.

6.3.12 A small area of broad-leaved semi-natural woodland is situated to the east of the southern-most land parcel. This is part of larger area of woodland that lies between the two parcels. Species present include goat willow *Salix caprea*, birch *Betula sp*, field maple *Acer campestre*, hazel *Corylus avellana* and larch *Larix decidua*.

6.3.13 Field boundaries within and around the Application Site are formed by fences and hedgerows; with those in the northern parcel of land mainly managed, intact, species poor hedgerows and those within the southern parcel supporting more species rich hedgerows with young trees. Species present within the hedgerows include hawthorn *Crataegus monogyna*, dog rose *Rosa canina*, blackthorn *Prunus spinosa*, hazel, oak *Quercus sp*, common ash *Fraxinus excelsior*, and rowan *Sorbus aucuparia*, cherry *Prunus sp*, birch and goat willow.

6.3.14 Habitats recorded within the Application Site are considered to be typical of the predominant habitats present in the wider landscape.

Table 6.5: Target Notes

Target Note and Tree/Pond Reference Number	Comments
TN1	Species-poor managed hedgerow approximately 1.5m in height. Species present includes hawthorn, dog rose and blackthorn. Hedgerow is 2m from the boundary fence.
TN2	Species-poor managed hedgerow approximately 1.5m in height. Species present includes hawthorn, dog rose and blackthorn with occasional young oak hazel and rowan as hedge species.
TN3	Species-poor managed hedgerow approximately 1.5m in height. Species present includes hawthorn, dog rose and blackthorn with occasional young oak, hazel and rowan as hedge species.
TN4	Species-poor managed hedgerow approximately 1.5m in height. Species present includes hawthorn, dog rose and blackthorn with occasional young oak, hazel and rowan as hedge species.
TN5	Species-poor hedgerow with young trees and 4m in height. The hedge is very scattered and gappy and located 2m from the boundary with a fence. Species present includes oak, ash, hazel, rowan and alder *Alnus glutinosa*.

Target Note and Tree/Pond Reference Number	Comments
TN6	Species-poor managed hedgerow approximately 1.5m in height. Species present includes hawthorn, blackthorn, dog rose and occasional very young oak, ash and hazel.
TN7	Species-poor managed hedgerow approximately 1.5m in height. Species present includes hawthorn, blackthorn, dog rose and occasional very young oak, ash and hazel.
TN8	Species-poor managed hedgerow approximately 1.5m in height. Species present includes hawthorn, blackthorn, dog rose and occasional very young oak, ash and hazel.
TN9	Semi-natural broad-leaved woodland with goat willow, oak, occasional larch and young ash (5m). Rosebay willowherb *Chamaenerion angustifolium*, common nettle *Urtica dioica*, creeping buttercup *Ranunculus repens* and bramble *Rubus fruticosus* spp are present in the ground flora.
TN10	Semi-natural broad-leaved woodland with goat willow, birch, field maple, hazel and larch which are approximately 8m in height. Ground flora species present include bramble and rosebay willowherb.
TN11	Two oak trees which are 12m in height and have negligible bat potential.
TN12	Species-rich hedgerow with young trees, which are 4m in height. Species present within the hedgerow includes cherry, birch, hazel, hawthorn, ash, rowan, goat willow and dog rose.
TN13	Species-rich hedgerow with young trees, which are 4m in height. Species present within the hedgerow includes cherry, birch, hazel, hawthorn, ash, rowan, goat willow and dog rose.
TN14	Species-rich hedgerow with young trees, which are 4m in height. Species present within the hedgerow includes cherry, birch, hazel, hawthorn, ash, rowan, goat willow and dog rose.
TN15	Species-rich hedgerow with young trees, which are 4m in height. Species present within the hedgerow includes cherry, birch, hazel, hawthorn, ash, rowan, goat willow and dog rose.
TN16	Three ash trees which are 30m in height. Spindly growth with no ivy *Hedera helix* cover and no bat roosting potential.
TN17	Species-rich hedgerow with young trees, which are 4m in height. Species present within the hedgerow includes cherry, birch, hazel, hawthorn, ash, rowan, goat willow and dog rose.
TN18	Species-rich hedgerow with young trees, which are 4m in height. Species present within the hedgerow includes cherry, birch, hazel, hawthorn, ash, rowan, goat willow and dog rose.
TN19	Semi-natural broad-leaved woodland. Woody species includes aspen *Populus tremula*, birch, goat willow, dog wood *Cornus sanguinea*, oak and guelder rose *Viburnum opulus*. Ground flora

Target Note and Tree/Pond Reference Number	Comments
	present includes bramble, rosebay willowherb, nettle and cleavers *Galium aparine*.
TN20	Species-rich hedgerow with young trees, which are 4m in height. Species present within the hedgerow includes cherry, birch, hazel, hawthorn, ash, rowan, goat willow and dog rose.
TN21	Species-rich hedgerow with young trees, which are 4m in height. Species present within the hedgerow includes cherry, birch, hazel, hawthorn, ash, rowan, goat willow and dog rose.
TN22	Farm buildings located adjacent to the Application Site which have negligible bat roosting potential.
P1	Pond situated approximately 249m to the east of the Application Site. The waterbody was approximately 330m in perimeter.
P2	Pond situated approximately 60m to the east of the Application Site. The waterbody was approximately 180m in perimeter.
P3	Pond situated approximately 60m to the east of the Application Site but not showing on aerial images.
P4	Pond situated approximately 40m to the south of the Application Site. The waterbody was approximately 105m in perimeter.
P5	Pond situated approximately 35m to the west of the Application Site. The waterbody was approximately 40m in perimeter.

6.3.15 A separate Arboricultural Survey, Impact Assessment and Protection Plan is provided at **Appendix 5.2**.

Protected and Priority Species

Birds

6.3.16 The breeding bird survey recorded an assemblage of breeding farmland species, typical of the habitat and locale. Hedgerow field boundaries provide suitable habitat for a variety of breeding birds. The bird assemblage recorded includes some species of conservation value12 such as yellowhammer *Emberiza citronella* and skylark *Alauda arvensis*. Results from the bird survey are illustrated on **Figure 6.4.**

6.3.17 There are no features within the Application Site that are considered suitable nesting locations for species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). The data search returned records of nine Schedule 1 species within 2km of the Application site including; barn owl *Tyto alba*, common crossbill *Loxia curvirostra*, Goshawk *Accipiter gentilis*, Kingfisher *Alcedo atthis*, Peregrine *Falco peregrines*, Redwing *Turdus iliacus*, Fieldfare *Turdus pilaris*, Little ringed plover *Charadrius dubius* and red kite *Milvus milvus*. Species such as barn

[12] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746.

owl, goshawk, peregrine, redwing, fieldfare and red kite may on occasion use the Application Site and surroundings for foraging and hunting purposes but habitats are not present to support kingfisher, little ringed plover or the common crossbill.

6.3.18 Data provided by BIS identified sixty-three protected and notable bird species within 2km of the Application Site. These are detailed in **Table 6.6,** alongside their conservation status.

6.3.19 The following conservation priority lists are used:

- Species listed under Schedule 1 of the Wildlife and Countryside Act 1981, as amended (WCA S1);
- Species listed as 'Red' (highest conservation priority) and Amber on Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man (BoCC, 2015);
- Priority listed species on the UK Biodiversity Action Plan (UK BAP);
- The Powys Local Biodiversity Action Plan 2002 (LBAP)[13]; and
- Species of principal importance for the purpose of conserving biodiversity covered under Section 7 of the Environment Act 2016 (Wales) (S7).

Table 6.6: Protected and Notable bird records within 2km of the Application Site boundaries

Species Records		**Conservation Status**
Barn owl	*Tyto alba*	WCA S1, LBAP
Blackcap	*Sylvia atricapilla*	LBAP
Blue tit	*Cyanistes caeruleus*	Bern, LBAP
Bullfinch	*Pyrrhula pyrrhula*	S7, UKBAP, BoCC - Amber
Buzzard	*Buteo buteo*	LBAP
Chiffchaff	*Phylloscopus collybita*	LBAP
Coal tit	*Periparus ater*	LBAP
Common crossbill	*Loxia curvirostra*	WCA S1, LBAP
Common Sandpiper	*Actitis hypoleucos*	BoCC - Amber
Cuckoo	*Cuculus canorus*	S7, UKBAP, BoCC - Red
Curlew	*Numenius arquata*	S7, LBAP, BoCC – Red, UKBAP
Dipper	*Cinclus cinclus*	LBAP, BoCC - Amber

[13] https://en.powys.gov.uk/article/2553/Local-Biodiversity-Action-Plan

Species Records		Conservation Status
Dunnock	*Prunella modularis*	S7, UKBAP, BoCC - Amber
Fieldfare	*Turdus pilaris*	WCA S1, BoCC – Red
Garden Warbler	*Sylvia borin*	LBAP
Goldcrest	*Regulus regulus*	LBAP
Goldfinch	*Carduelis carduelis*	LBAP
Goosander	*Mergus merganser*	LBAP
Goshawk	*Accipiter gentilis*	WCA S1, LBAP
Grasshopper warbler	*Locustella naevia*	S7, LBAP, BoCC – Red, UKBAP
Great spotted woodpecker	*Dendrocopos major*	LBAP
Great tit	*Parus major*	LBAP
Green woodpecker	*Picus viridis*	LBAP
Greenfinch	*Chloris chloris*	LBAP
Grey wagtail	*Motacilla cinerea*	LBAP, BoCC - Red
House martin	*Delichon urbicum*	LBAP, BoCC – Amber
House sparrow	*Passer domesticus*	S7, BoCC – Red, UKBAP
Kestrel	*Falco tinnunculus*	S7, LBAP, BoCC - Amber
Kingfisher	*Alcedo atthis*	WCA S1, LBAP, BoCC - Amber
Lapwing	*Vanellus vanellus*	S7, LBAP, UKBAP, BoCC - Red
Lesser redpoll	*Acanthis cabaret*	S7, LBAP, BoCC – Red, UKBAP
Linnet	*Carduelis cannabina*	S7, UKBAP, BoCC – Red, LBAP
Little grebe	*Tachybaptus ruficollis*	-
Little ringed plover	*Charadrius dubius*	WCA S1, LBAP

Species Records		Conservation Status
Long-tailed tit	*Aegithalos caudatus*	-
Meadow pipit	*Anthus pratensis*	BoCC - Amber
Mistle thrush	*Turdus viscivorus*	BoCC - Red
Nuthatch	*Sitta europaea*	LBAP
Peregrine	*Falco peregrinus*	WCA S1, LBAP
Pied wagtail	*Motacilla sp*	LBAP
Raven	*Corvus corax*	-
Red kite	*Milvus milvus*	WCA S1, LBAP
Redstart	*Phoenicurus phoenicurus*	LBAP
Redwing	*Turdus iliacus*	WCA S1, LBAP, BoCC - Red
Reed bunting	*Emberiza schoeniclus*	S7, LBAP, BoCC – Amber, UKBAP
Sand martin	*Riparia riparia*	LBAP
Siskin	*Spinus spinus*	LBAP
Skylark	*Alauda arvensis*	S7, UKBAP, BoCC - Red
Snipe	*Gallinago gallinago*	LBAP, BoCC - Amber
Song thrush	*Turdus philomelos*	S7, LBAP, BoCC – Red, UKBAP
Sparrowhawk	*Accipiter nisus*	LBAP
Spotted flycatcher	*Muscicapa striata*	S7, LBAP, BoCC - Red
Starling	*Sturnus vulgaris*	S7, UKBAP, BoCC - Red
Stonechat	*Saxicola rubicola*	LBAP
Swallow	*Hirundo rustica*	LBAP
Swift	*Apus apus*	BoCC – Amber

Species Records		Conservation Status
Teal	*Anas crecca*	BoCC - Amber
Tree pipit	*Anthus trivialis*	S7, LBAP, BoCC – Red, UKBAP
Wheatear	*Oenanthe oenanthe*	LBAP
Whitethroat	*Sylvia communis*	LBAP
Willow warbler	*Phylloscopus trochilus*	BoCC - Amber
Wood warbler	*Phylloscopus sibilatrix*	S7, LBAP, BoCC – Red, UKBAP
Woodcock	*Scolopax rusticola*	LBAP

Breeding Bird Survey Results

6.3.20 A breeding bird survey was undertaken on the 14th June 2019. The results of the breeding bird survey, including all species recorded along, species conservation status and an estimated number of the breeding pairs present within the Application Site are detailed within **Table 6.7** below.

Table 6.7: Breeding Bird Survey Results.

Species	Conservation status	Maximum number of territories	Non-breeding	Comments
Pheasant *Phasianus colchicus*	-	1	-	-
Woodpigeon *Columba palumbus*	-	3	-	Singing in right habitat.
Swift *Apus apus*	LBAP, BoCC – Amber	0	5	-
Skylark *Alauda arvensis*	S7, UKBAP, BoCC - Red	2	-	Singing in right habitat.
Robin *Erithacus rubecula*	-	10	-	Singing in right habitat.
Wren *Troglodytes troglodytes*	-	6	-	Singing in right habitat.
Dunnock *Prunella modularis*	S7, UKBAP, BoCC - Amber	8	-	Singing in right habitat.
Blackbird *Turdus merula*	-	7	-	Singing in right habitat.
Song thrush *Turdus philomelos*	S7, UKBAP, BoCC - Red	3	-	Singing in right habitat.
Long-tailed tit	-	4	-	Singing in

Species	Conservation status	Maximum number of territories	Non-breeding	Comments
Aegithalos caudatus				right habitat.
Blue tit *Cyanistes caeruleus*	-	4	-	Singing in right habitat.
Chaffinch *Fringilla coelebs*	-	5	-	Singing in right habitat.
Goldfinch	LBAP	5	-	Singing in right habitat.
Buzzard	LBAP	2	-	Singing in right habitat.
Great tit	LBAP	1	-	Singing in right habitat.
Willow warbler	BoCC - Amber	4	-	Singing in right habitat.
Chiffchaff	LBAP	3	-	Singing in right habitat.
Blackcap	LBAP	6	-	Singing in right habitat.
Mallard	-	3	-	Singing in right habitat.
Redstart	LBAP	1	-	With family.
Swallow	LBAP	0	1	-

Bats

6.3.21 Records of at least six bat species were returned within a 2km radius of the Application Site as detailed within **Table 6.8** alongside their conservation status.

Table 6.8: Bat species records within 2km radius.

Common name	Latin name	No. of records	No. roost records	Conservation Status
Unidentified species	*Chiroptera sp.*	9	3	HabDir, WCA S5,
Pipistrelle species	*Pipistrellus sp.*	6	1	HabDir, WCA S5, LBAP
Common pipistrelle	*Pipistrellus pipistrellus*	2	0	HabDir, WCA S5, LBAP, S7
Soprano pipistrelle	*Pipistrellus pygmaeus*	1	0	HabDir, WCA S5, S7, UKBAP, LBAP
Brown long-eared bat	*Plecotus auritus*	2	0	HabDir, WCA S5, S7, UKBAP, LBAP
Myotis species	*Myotis sp.*	1	0	HabDir, WCA S5, LBAP
Whiskered bat	*Myotis mystacinus*	1	0	HabDir,WCA S5, LBAP

Common name	Latin name	No. of records	No. roost records	Conservation Status
Nyctalus species	*Nyctalus sp*	1	0	HabDir, WCA S5, LBAP

* HabDir: Conservation of Habitats and Species Regulations 2017 (as amended), WCA S5: Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), S7: section 7 of the ENVIRONMENT ACT (WALES) 2016, UKBAP: UK Biodiversity Action Plan, LBAP: The POWYS Local Biodiversity Action Plan 2002.

6.3.22 The boundary habitats within the Application Site, hedgerows and trees, are likely to provide moderate commuting and foraging opportunities for bats, however, the open grassland fields that dominate the Application Site are of low value to foraging/commuting bat species.

6.3.23 Trees within the Application Site are generally young in age and contain negligible bat roosting potential. A number of farm buildings were located adjacent to the Application site, situated to the south-west of the northern parcel of land, also with negligible roost potential (TN22, **Table 6.5**).

Badger

6.3.24 BIS returned no badger Meles meles records within a 2km radius of the Application Site.

6.3.25 No badger setts or field signs indicating badger activity were identified during the Extended Phase 1 habitat survey. However, it is considered that habitats within the Application Site (primarily hedgerows and field boundaries) may potentially support foraging/commuting badgers that are likely to be present within the wider landscape.

Otter and Water Vole

6.3.26 BIS returned a single field observation record of water vole located 700m from the Application Site boundaries, and twenty records of otter within 2km .

6.3.27 The dry ditch located adjacent to the Application Site offers negligible potential for either of these species. The Afon Twrch is situated to 150m to the west at its closest point to the Application Site which potentially could support otter and water voles.

6.3.28 No other habitat was found on the Application Site which is suitable to support water voles.

6.3.29 Terrestrial habitat (woodland) within the Application Site and in the wider area could be used by otters, if present, for resting up/holt habitat.

Hazel Dormouse

6.3.30 BIS returned no records of hazel dormouse *Muscardinus avellanarius* within 2km of the Application Site boundaries. Isolated small populations of dormice are known to be present in the Brecon Beacons located further to the north.

6.3.31 During the extended Phase 1 habitat survey the Application Site was assessed for its potential of support hazel dormouse, based on guidance outlined in the

Dormouse Conservation Handbook[14]. There are boundary features (hedgerows and a small area of woodland) that potentially offer hazel dormice foraging/hibernation habitat, albeit this suitability is limited. Hedgerows within the Application Site boundaries are generally, species poor to the north and more species rich to the south. However, all the hedgerows contain small amounts of hazel which is optimal dormouse habitat. The hedgerows also have connectivity to further hedgerow systems and woodland in the wider environment.

Amphibians

6.3.32 BIS returned no records of amphibian species within a 2km radius of the Application Site.

6.3.33 No aquatic habitats were identified within the Application Site during the Extended Phase 1 habitat survey (see **Figures 6.1 and 6.4**). It is considered that the dominant habitat (improved grassland) is largely unsuitable as amphibian terrestrial habitat, however, field boundary features such as hedgerows (and adjoining woodland) provide limited suitable terrestrial habitats for amphibians.

6.3.34 Five water bodies were identified on surrounding land within 250m of the Application Site boundary (information on water bodies was obtained from OS maps and aerial images). The closest of these was located approximately 40m south of the Application Site as shown on **Figure 6.4.** It was not possible to access any of the five ponds during the Extended Phase 1 habitat survey. Three of these ponds (P1, P2, P3) were however assessed for their amphibian habitat suitability in 2013 as part of a planning application on nearby land[15].

Reptiles

6.3.35 BIS provided one record of common lizard *Zootoca vivipara* within 2km of the Application Site boundaries, but over 800m to the west of the Application Site. A reptile survey on adjacent land in 2013 did not find any reptiles present within the adjacent land, which has direct linkages to the Application Site

6.3.36 The Application Site is dominated by improved grassland, which is considered to be of a negligible value for reptile species, however, the hedgerows and associated field edges do provide (albeit limited) habitat opportunities for foraging/hibernation purposes.

6.3.37 The Application Site has good habitat connectivity to similar extensive farmland habitats in the wider landscape.

Other Notable Species

West European Hedgehog

6.3.38 BIS provided two records of West-European hedgehog Erinaceus europaeus. The hedgerow systems and associated field boundaries within the Application Site provide suitable habitat for foraging and hibernating hedgehogs, these habitats also have good habitat connectivity with the wider environment, thereby providing suitable corridors for the species to enter and populate the Application Site. This species is listed as priority species in Wales under Section 7 of the Environment Act 2016.

[14] https://ptes.org/wp-content/uploads/2014/06/Dormouse-Conservation-Handbook.pdf (accessed 31.01.2018)
[15] Unknown Site Title (2015) *Environmental Statement* LDA Design Consultancy LLP, London

Invertebrates

6.3.39 BIS provided ten records of protected invertebrates relating to eight species within 2km of the Application Site. Records of Grayling *Hipparchia semele*, September thorn *Ennomos erosaria*, Small heath *Coenonympha pamphilus*, Small Pearl-bordered Fritallary *Boloria selene*, White-letter hairstreak *Satyrium w-album* and Marsh Fritillary *Euphydryas aurinia* were recorded which are all priority species in Wales under Section 7 of the Environment Act 2016. The latter two white letter hairstreak and marsh fritillary are also protected under Schedule 5 of the Wildlife & Countryside Act. An additional two species; Red wood ant *Formica rufa* and Silver washed Fritillary *Argynnis paphia* were recorded within 2km which as well as Small pearl-bordered fritillary and marsh fritillary which are all Local BAP species.

6.3.40 Habitats present on the Application Site are not suitable to support the protected invertebrates which rely on woodland and heathland habitat.

Invasive Non-native Species

6.3.41 BIS returned no records of invasive species within 2km of the Application Ste boundaries and no invasive non-native species were observed during the survey.

Determining Ecological Features to be Included in the Detailed Assessment

6.3.42 The results of the desk study, Extended Phase 1 habitat survey and breeding bird survey were used to inform the identification of important ecological features within the Application Site.

6.3.43 Only those ecological features that it was considered could experience significant effects (e.g. affecting protected or notable habitats and species or biodiversity objectives or the favourable conservation status of a species' population), and which were identified as being of sufficient importance (informed also by professional judgement) to be material to decision making, have been identified for detailed assessment.

6.3.44 **Table 6.9** presents the evaluation of ecological features and provides the rationale as to why individual features have been included or excluded of the detailed assessment.

Table 6.9: Importance of ecological features

Ecological feature	Geographic scale of importance	Potential Effect Pathways and Rationale for selection of Features for Detailed Assessment
Statutory designated sites	National	One statutory site within 2km designated for its geological importance. There will be no direct or indirect effects on statutory protected sites greater than 2km away from the Application Site due to the nature of the Proposed Development and separation distances. **Excluded from detailed assessment**
Non-statutory	County	Six SINCs located within 2km of the Application

Ecological feature	Geographic scale of importance	Potential Effect Pathways and Rationale for selection of Features for Detailed Assessment
designated sites		Site boundary. The nearest being Pant-y-Brwyn SINC, 0.5km west of the Application Site. No direct effects anticipated. With the localised nature of the works combined with the distance of the designated sites, it is considered there will be no indirect effects on the non-statutory designated sites. **Excluded from detailed assessment**
General habitats	Local	Habitats within the Application Site are common and widespread locally and regionally. **Scoped into the assessment** due to potential effects on protected or notable species that may utilise such habitats.
Birds	Local	The Application Site supports a limited bird assemblage typical of farmland setting, including species of conservation value. Potential for destruction of nests or disturbance to breeding birds depending of timing of the construction phase. **Included in the detailed assessment.**
Bats	Local	The Application Site is generally of low interest for bat species, but provides foraging and commuting opportunities, most notably along hedgerows. No trees or structures present with potential to support roosting bats. Common pipistrelle, soprano pipistrelle, brown long-eared bat, Whiskered bat and a number of unidentified bat species have been recorded within the adjacent landscape. All UK bats and their roosts are protected. **Included in the detailed assessment**.
Badger	Site	No badger setts were identified within the Application Site. **Considered in the mitigation section only (standard good practice measures).**

Ecological feature	Geographic scale of importance	Potential Effect Pathways and Rationale for selection of Features for Detailed Assessment
Hazel dormouse	Local	No dormouse records for the 2km search area but the species is known to be present within the County. Habitat is suitable in parts of the Application Site and the wider area including species-rich hedgerows and woodland that dormouse (if present) could utilise. **Included in the detailed assessment.**
Otter and water vole	Site	No suitable habitat for water vole within or adjacent to the Application Site. The Application Site is located sufficiently far from the Afon Twrch to avoid any risk of indirect effects on water voles, if present along this watercourse. Otter could utilise habitats such as woodland for holt/resting up areas which are present within and immediately adjacent to the Application Site. No otter holts or resting up areas were found during survey. **Water vole excluded from detailed assessment.** **Otters are considered in the mitigation section only (standard good practice and precautionary measures).**
Amphibians	Local	No records of amphibians were returned within 2km and no waterbodies are present within the Application Site. Five ponds are located within 250m of the Application Site (not accessed during the Extended Phase 1 habitat survey). The dominant habitat within the Application Site (improved grassland) is of very low suitability as amphibian terrestrial habitat, however, field boundary features such as hedgerows provide more suitable habitats for amphibians if present. **Included in the detailed assessment.**
Reptiles	Local	On record of common lizard was returned within 2km of the Application Site. Hedgerow bases within the Application Site are

Ecological feature	Geographic scale of importance	Potential Effect Pathways and Rationale for selection of Features for Detailed Assessment
		considered suitable for reptiles, although of limited value. **Included in the detailed assessment.**
Other Species	Site/Local	Habitats within the Application Site are not considered suitable for protected invertebrate species found within 2km. Hedgehogs are unlikely to be dependent on the Application Site at a population level but individuals may occasionally be present. **Invertebrates and other species including hedgehog are considered in the mitigation section only.**
Invasive Non-native species	Local	There are no records of invasive species within 2km of the Application Ste boundaries and no invasive species were recorded within the Application Site boundaries during survey. **Considered in the mitigation section only (standard good practice precautionary measures).**

6.4 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

6.4.1 The potential effects of the Proposed Development through the construction, operational and decommissioning phases are discussed below in relation to the ecological features identified in **Table 6.9** and included for detailed assessment. Effects are initially assessed in the absence of mitigation, with residual effects presented thereafter. This assessment is based upon the Bryn Henllys Extension Layout Plan.

Likely Future Baseline

6.4.2 In the absence of the Proposed Development, the land within the Application Site is considered to remain under intensive agricultural management, dominated by improved grassland, hedgerows (with occasional scattered trees) are likely to remain in situ and subject to regular management. No other changes in the future baseline are anticipated.

Construction Phase

6.4.3 Potential construction phase ecological effects associated with the Proposed Development are considered to relate to:

- Direct land take (habitat loss) to accommodate the Proposed Development;
- Temporary disturbance and land take during construction;
- Disturbance to, fragmentation or severance of connecting habitat or potential commuting routes within and adjacent to the Application Site;

- Disturbance and pollution (indirect effects such as noise and vibration, dust, pollution from surface water run-off) resulting from site clearance and construction, plant and vehicles movements and site workers' activities.

6.4.4 The same construction access and construction compound will be used for the Proposed Development as for the approved Bryn Henllys solar farm, with materials transferred within Bryn Henllys and the site. The construction of the Proposed Development would be undertaken at the same time as Bryn Henllys solar farm, resulting in an extension to the previous 30 week construction period to circa 45 weeks. The approved Bryn Henllys solar farm is located immediate east of the southern parcel of the Application Site, with access to the Application Site proposed through Bryn Henllys solar farm.

Habitats

6.4.5 Although the Application Site encompasses an area of approximately 25.59 ha; construction of a solar farm generally requires very low levels of direct and permanent land take (typically less than 5% footprint on the ground) for the infrastructure. Direct loss of habitat is therefore considered to be minimal, as habitat of biodiversity value can and be established and maintained under and around the panels. The construction works will be predominantly confined to areas of improved grassland of low ecological value which is already subject to regular disturbance due to intensive agricultural management of the land.

6.4.6 A desk-based review of data held on the MAGIC website identified one habitat of Principl Importance (marshy grassland) within the Application Site boundary. However, this habitat was not identified as present during the Extended Phase 1 Habitat survey undertaken in June 2019. The field survey identified only improved grassland across the entire Application Site. In the absence of marshy grassland (or any other habitat of Principal Importance), the impacts of construction are therefore restricted to improved grassland, which is widely present locally and nationally.

6.4.7 Other habitats present in and around the Application Site, namely trees and hedgerows, will be retained and protected during construction in line with BS 5837:2012 *Trees in relation to design, demolition and construction*. These habitats, which also provide connectivity in the landscape, will therefore experience negligible impacts.

6.4.8 The effects of construction on habitats are therefore confined to a relatively small (approximately 5%) loss of improved grassland (for the lifetime of the development) and temporary, short term disturbance during active works. Improved grassland is a feature of **Site** value/importance only (as described in **Table 6.9**) and effects are assessed as **negligible** and **not significant**.

6.4.9 There are no watercourses, ditches or waterbodies within the Application Site. Surface water run-off, as a result of ground disturbance, has the potential to cause localised indirect pollution of off-site ponds and other wetland features in the surrounding area. However this risk can be readily avoided through the implementation of standard good practice pollution prevention and runoff management in line with current guidelines. The potential for indirect impacts on off-site habitats are considered to be of **negligible** magnitude on features of importance at the **Local** scale and therefore to be **negligible** and **not significant**.

Fauna

Birds

6.4.10 The Application Site provides suitable breeding and foraging value for a typical farmland bird assemblage. Potential effects on birds during construction relate to the temporary loss of breeding or foraging habitat, directly within the Application Site, or indirectly within adjacent areas through disturbance or displacement, if undertaken within the bird breeding season. Works outside the breeding season (generally considered to be March-August inclusive) will have no potential to affect breeding birds.

6.4.11 Hedgerows and trees located along field boundaries (which will be retained and protected as part of the Proposed Development) support a range of typical farmland nesting bird species; these habitats will likely be subject to some level of localised indirect disturbance or displacement for a temporary period during the construction period (should this occur during the nesting season). No effects will occur if construction is undertaken outside of the breeding season. There are no habitats suitable on site to support nesting Schedule 1 species. The hedgerow and grassland habitats may potentially contribute to foraging opportunities within wider territories for a range of Schedule 1 species including redwing, fieldfare, red kite, peregrine, barn owl and goshawk if present in the wider area, but such species would not depend on the low value grassland habitat within the Application Site.

6.4.12 If works take place in the bird breeding season, suitable measures will be required to be set in place to ensure legal compliance, including pre-construction nest checks, and avoidance of works likely to harm nesting birds or their young, as set out in the Wildlife and Countryside Act 1981 (as amended). There will be **negligible** effects on breeding birds or local populations of farmland birds, during construction, which is **not significant.**

6.4.13 Hedgerows and trees will be retained and protected during construction, maintaining these features which can be used by a range of bird species. . Ground nesting species are likely to be temporarily displaced by the works but only if these coincide with the breeding season. Once construction is complete, disturbed ground will be reinstated and sown with a botanically diverse grassland seed mix which maintain and enhance opportunities for nesting and foraging bird species using the Application Site in the future. A **negligible** extent of foraging habitat loss and disturbance is anticipated for local bird populations including the any Schedule 1 species present in the wider area.

6.4.14 Overall, effects on birds are considered likely to be **negligible** in the context of this rural agricultural landscape , temporary (during the construction phase only) and **not significant**.

Bats

6.4.15 Construction-related effects on bats are likely to involve the temporary loss of a small extent of low value foraging habitat (improved grassland). With no permanent hedgerow or tree habitat removal, the Proposed Development will not result in the direct loss or severance of potential foraging habitats and/or commuting routes around the Application Site.

6.4.16 As construction activities will take place during the daytime, moderate value foraging/commuting hedgerow and tree habitat located on field boundaries will remain available to bats species present and utilising such features. There is an

abundance of similar suitable habitats in the wider agricultural landscape. Very localised disturbance to small sections of hedgerow (e.g. for access) and loss of low value grassland habitat, will have negligible effects on connectivity or wider availability of foraging resources on local bat populations.

6.4.17 Bats (roosting, foraging and commuting) may be affected through the use of temporary lighting of the construction site and adjoining habitats if works extend after dark. However, construction will take place during daylight and trees and hedgerows are not anticipated to be illuminated after dark. Any sort term lighting used during construction will be highly localised in small areas of the Application Site at any one time, and designed to minimise additional light spill. As a result, the potential effects of lighting on bats during the construction phase are considered to be temporary and of **negligible** on a feature of **Local** importance and therefore **not significant**.

6.4.18 Trees within the Application Site were assessed for their roost potential and physical condition during the Extended Phase 1 Habitat survey and Arboricultural survey. Trees were young in age and considered to have negligible bat roost potential. Farm buildings located adjacent to the Application Site boundary will not be affected by the proposed works and will not be subject to additional illumination during works. As a result the risk of direct disturbance/impact to an active bat roost as a result of the proposed works is considered to be **negligible** and **not significant.**

6.4.19 Overall, effects on bats/local bat populations from construction are considered **negligible** and temporary on a feature of importance at the **Local** scale and therefore **not significant**.

Hazel Dormouse

6.4.20 No records of dormice were found within 2km of the Application Site boundary during desk study, and the extent of suitable habitat for this species within the Application Site is restricted to boundary hedgerows (some species-poor and less suitable) and a pocket of woodland. These features will not be affected by construction and will be retained and protected during works as described under habitats above. Improved grassland, which forms the majority of the Application Site, is sub-optimal and largely unsuitable for dormice, especially as it is subject to regular intensive agricultural management.

6.4.21 There exists more suitable habitats in the areas beyond the Application Site, which have good connectivity to the wider landscape, including woodland containing bramble scrub. These off-site habitats will be unaffected by the Proposed Development.

6.4.22 Given the very low probability of this species being present and with the retention and protection of habitats with potential to support dormice (if present), the construction phase is considered to have **negligible** magnitude impact on a receptor of **Local** value (**Table 6.9**) which would have a **negligible** effect on local populations of this species and is **not significant**.

Amphibians

6.4.23 There are no records of amphibians within 2km of the Application Site, and no waterbodies are present within the Application Site. The dominant habitat across the Application Site (improved grassland) is of low suitability as amphibian terrestrial habitat, with field boundary features providing some limited areas of more suitable habitat for foraging, dispersal and overwintering.

6.4.24 Five water bodies have been identified within 250m of the Application Site, none of which will be directly or indirectly affected during construction with standard good practice pollution prevention measures in place.

6.4.25 Three of these ponds (P1, P2, P3) were assessed for their amphibian habitat suitability in 2013 as part of a planning application on nearby land[16]. Ponds 1 and 2 were classified as having poor suitability for great crested newts and P3 was dry at the time of survey and described as rarely holding water.

6.4.26 As stated previously the permanent land take for solar farm developments is typically low (less than 5% footprint on the ground) and construction works cause only localised disturbance for a temporary period of time. Current intensive agricultural management of the field will also cause regular ground disturbance.

6.4.27 The lack of local records, poor habitat suitability of ponds surveyed previously within 250m, absence of any on-site waterbodies and low value terrestrial habitat within the proposed construction area indicates that it is highly unlikely that great crested newts are present within the Application Site.

6.4.28 The implementation of standard good practice protection measures during the construction works will be sufficient to avoid significant impacts on amphibian and reptile populations potentially present,.

6.4.29 Habitat connectivity will be maintained around the Application Site during works through the retention and protection of hedgerow and tree boundary features.

6.4.30 Potential effects on either individuals or local populations of great crested newts and other amphibians; features of **Local** importance, are therefore assessed to be negligible and **not significant. Negligible** effects on great crested newt populations (if present) are considered likely due to the nature of the Proposed Development (temporary disruption during construction and limited land take for infrastructure), retention of hedgerow, and boundary features and no effects on off-site ponds.

Reptiles

6.4.31 Construction-related effects on reptiles are likely to involve very localised disturbance to small sections of sub-optimal hedgerow habitat which reptiles could utilise if present. One record of a common lizard dating back to 2014 is located over 800m to the west of the Application Site, and separated from it by intervening barriers in the form of Afon Twrch water course and the A4068 New Road. It is therefore highly unlikely that reptiles (if still) present in this area will be using sub-optimal habitat within the Application Site boundary.

6.4.32 A reptile survey was conducted as part of the adjacent planning application in 2013. The survey did not find any reptiles present within the adjacent site, which has direct linkages to the Application Site.

6.4.33 With this in mind it is considered that the presence of reptiles on the Application Site is very unlikely. t is therefore considered that the temporary nature of works, absence of local records and low value reptile habitatwill result in **negligible** magnitude impact on local reptile populations (if present) a feature of importance at the **Local** scale and thereforewould have a **negligible effect** which is **not significant** .

[16] Unknown Site Title (2015) *Environmental Statement* LDA Design Consultancy LLP, London

Operation

6.4.34 Operational effects are those occurring following the construction of the solar park. Some effects may reduce with time and habituation, or remain for the lifetime of the development. Solar farms operate with little intervention of disturbance required, limited to occasional maintenance visits.

6.4.35 Over time, dirt and dust can accumulate on the glass surface of the modules, reducing its power output. Periodic cleaning of PV modules where required will be require only soft brushes and soft, clean water with a recommended pressure less than 690kPa, typical of most municipal water systems. No chemicals are required for the cleaning process, thereby reducing the potential for ground contamination. The ecological impacts of periodic PV cleaning or other maintenance visits are considered to be **negligible** and **not significant** and likely to be less disruptive than ongoing normal farming operations.

6.4.36 There are no additional operational effects relating to land take, habitat loss or disturbance other than those already addressed under Construction.

Birds

6.4.37 Once constructed, the Proposed Development generates negligible noise or disruption, likely to be less than that associated with normal farming practices in the locality to which local bird populations have already become habituated. Periodic cleaning and maintenance of PV modules will take place outside of the nesting bird season (generally March-August inclusive), where practicable and involves minimal levels of disturbance. The ecological impacts of periodic PV cleaning and maintenance is assessed to be **negligible** and **not significant**.

6.4.38 There would be no additional habitat loss (and hence loss of potential breeding areas) over and above that assessed under Construction Effects.

6.4.39 Additionally, newly created/planted habitats within the Application Site will be managed in accordance to the methods detailed within the Biodiversity Management Plan (**Appendix 6.2**) and will therefore provide further habitats for nesting bird species once established.

6.4.40 Overall, operational effects of the Proposed Development on birds are assessed to be **negligible** and **not significant.**

Bats

6.4.41 No permanent lighting of the facility will be required other than entrance lighting on a sensor at inspection points, thereby retaining dark corridors for commuting and foraging bats if present.

6.4.42 Newly created grassland, trees and hedgerow habitats which form part of the design for the Proposed Development will be managed in accordance to the methods detailed within the Biodiversity Management Plan (**Appendix 6.2**) and will provide strengthened habitats for foraging and for commuting bat species once established.

6.4.43 As a result, operational effects of the Proposed Development on bats once new planting and habitat creation has established are assessed to result in a **low positive** magnitude impact and a **minor positive** effect which is **not significant.**

Hazel Dormouse

6.4.44 There would be no additional habitat loss over and above that assessed under Construction Effects. No habitat fragmentation is anticipated and no permanent lighting of the facility will be required.

6.4.45 Additional and strengthened woodland and hedgerow habitats will be managed in accordance to the methods detailed within the *Biodiversity Management Plan* (**Appendix 6.2**) and will provide further suitable habitat for a range of small mammals, including hazel dormouse if present in the wider area in the future.

6.4.46 Operational effects of the Proposed Development on hazel dormouse are assessed to be **negligible** and **not significant.**

Amphibians and Reptiles

6.4.47 During the operational phase there would be no additional habitat loss (and hence loss of potential terrestrial foraging or shelter) over and above that assessed and discussed under Construction Effects. Newly created grassland and hedgerow habitat, once established, will provide enhanced terrestrial habitats which will be suitable for amphibian and reptile species if present. Habitats on Site will be managed throughout the operational life of the Proposed Development to maintain their habitat interest (i.e to maintain botanically diverse grassland and hedgerows) in accordance with the *Biodiversity Management Plan* (**Appendix 6.2**).

6.4.48 Overall, operational effects of the Proposed Development on amphibians and reptiles are assessed to be **negligible** and **not significant**.

Summary

6.4.49 The Proposed Development will result in no significant adverse effects on any habitats or species, or on statutory, non-statutory designated sites. Minor (but not significant) positive effects are anticipated on foraging, commuting, roosting and breeding bats and birds (as well as other species including invertebrates and other small mammals) as a result of habitat creation and diversification which forms part of the design of the Proposed Development.

6.5 MITIGATION AND ENHANCEMENT

6.5.1 No significant adverse effects requiring specific mitigation have been identified as part of this assessment.

6.5.2 Embedded design elements and generally applicable good practice construction measures form part of the Proposed Development and are described below. These include precautionary measures to protect wildlife and maintain legislative compliance.

6.5.3 In addition, enhancement measures as part of the Proposed Development are included to ensure that the project delivers net biodiversity gain.

Embedded Design Elements

6.5.4 Design features have been incorporated in the Proposed Development which avoid and reduce the potential for adverse effects on field boundary habitats and protected and notable species. These include retaining and protecting trees

located along field boundaries during works in-line with BS 5837:2012 Trees in relation to design, demolition and construction**.**

6.5.5 The layout of the proposed development has been designed to avoid existing habitat features of local value, including hedgerows and other boundary habitats, trees and woodland.

6.5.6 Site run-off during construction and operation of the Proposed Development will be controlled and managed in line with current good practice guidance and Environment Agency advice to prevent possible indirect pollution effects on off-site habitats (including waterbodies and water courses) and associated species.

6.5.7 Any temporary lighting required during construction of the solar farm will be directed away from trees and hedgerows. This can be achieved in a number of ways, including the use of low level lighting and use of hoods and careful selection of lighting (further information is provided in BCT Guidance Note 8, 2018[17]). As long as lighting is designed in an appropriate manner, no discernible effects are anticipated on foraging bats in the local area.

6.5.8 New tree planting, hedgerow planting/infill and grassland creation proposed within the Application Site as shown on the Site Layout and Planting Plan will provide additional /strengthened foraging/commuting opportunities once established.

6.5.9 Landscape proposals for the Application Site have been designed to provide an overall biodiversity gain; in line with BS 42020 – *A Code of Practice for Biodiversity in Planning and Development*. Landscape proposals ensure that there is no net loss of habitats of ecological value and all habitat loss will be mitigated for appropriately. All habitat protection and enhancement measures will be informed by the Biodiversity Management Plan.

6.5.10 Proposed habitat enhancement measures (as shown within the Site Layout and Planting Plan) for the Application Site include:

- Approximately400m of native species rich hedgerow planting and infilling;
- Approximately 340m of tree planting along the northern boundary of the Application Site; and,
- Grassland seeding underneath the solar panels to create species diverse grassland.

6.5.11 This landscape planting and subsequent management will create greater structural and species diversity than is currently provided by the intensive agricultural management, and will provide favourable habitat conditions for a range of species, including amphibians, small mammals and invertebrates. Therefore it is considered that the proposed habitat enhancement works will result in a **significant** biodiversity benefit at a **Local/Site** scale.

Good Practice Measures

6.5.12 Site development works will be undertaken outside of the breeding bird season in so far as reasonably practical. The breeding bird season is generally acknowledged annually as 1st March to 31st August inclusive. Where this cannot be avoided, a competent ecologist will be appointed to undertake a pre-site clearance survey to identify the presence of any wild bird nests being built or in use. Only once the appointed ecologist is satisfied that an offence under Part 1 of

[17] *Guidance Note 8: Bats and Artificial Lighting* BCT and Institute of Lighting Professionals (2018)

the Wildlife and Countryside Act 1981 (as amended) will not occur, may works proceed.

6.5.13 A pre-construction badger survey will be undertaken before construction commences. If new evidence of badger setts is discovered within 30m of the construction areas, suitable protection and avoidance measures will be adopted in line with the advice of an ecologist. If necessary, such works may proceed under a licence to disturb badgers under the Protection of Badgers Act 1992.

6.5.14 As a precautionary good practice measure, all excavations left overnight will be covered in order to prevent animals falling in and becoming trapped. If it is not possible to cover them, a suitable means of escape will be provided. In addition works will be limited to daylight hours avoiding dusk and dawn when crepuscular species like otter and badger are active.

6.5.15 The perimeter deer/security fence around the Site will have suitable gaps at intervals at the base in order to allow a variety of mammal species (including badger, brown hare and West European hedgehog) to freely access the habitats within the Application Site. This will maintain habitat connectivity ion the landscape and permit wildlife to benefit from the relatively undisturbed habitats around and under the solar panels and along hedgerows.

Enhancement Measures

6.5.16 Management practices throughout the operational lifetime of the proposed development are proposed that will enhance the Application Site for the benefit of local wildlife over the longer term. The design and long-term management of the land seeks to maintain and improve functionality through protecting and enhancing potentially important wildlife corridors i.e. through infilling and maintenance of native species hedgerows within the Application Site and through the provision of a tree belt and wildflower meadow, as detailed within the Site Layout and Planting Plan and Biodiversity Management Plan.

6.5.17 Additional bird nesting provision will be made through the inclusion of a minimum of six bird boxes erected on suitable trees located along the Application Site boundaries or within the wider land ownership.

6.5.18 Boxes will be erected at an appropriate height of between 1 to 5 metres. Boxes should be angled so that they face away from the prevailing wind or in a semi sheltered environment. Positioning within or close to hedgerows will increase chances of occupation. Bird boxes will be suitable for a variety of farmland bird species.

6.5.19 Suitable specifications for bird boxes are provided in the Biodiversity Management Plan (**Appendix 6.2).**

6.5.20 Additional bat roost provision will be made through the inclusion of a minimum of six bat roost boxes on suitable mature and semi-mature trees along the Application Sites field boundaries. Boxes will be erected in suitable habitats, at an appropriate height (ideally above 4m in height) and with clear flight paths to utilise the Application Site field boundary features.

6.5.21 Suitable specifications for bat roosting boxes are provided in the Biodiversity Management Plan (**Appendix 6.2**).

Conclusion

6.5.22 With mitigation measures in place, the Proposed Development will have no significant residual effects on Ecology or Nature Conservation. Biodiversity net gain can be delivered through landscape planting and ecological enhancements along with a biodiversity management plan.

6.6 CUMULATIVE AND IN-COMBINATION EFFECTS

6.6.1 Total land take for solar farm developments is typically low (less than 5% footprint on the ground), construction works are low impact and short-term and of limited excavation for a temporary period of time, much of which will be undertaken on land subject to annual minor excavation and regular disturbance through tilling/ploughing and normal agricultural management practices.

6.6.2 The Proposed Development is located in a rural area with few other developments likely to have any discernible cumulative or in-combination effects. The only consented and scoped development agreed with the Local Planning Authority as requiring consideration and located within 1km of the Proposed Development is detailed within **Table 6.10**.

Table 6.10: Consented and Scoped Developments within 1km of the Proposed Development

Site	Planning Reference Number	Description of the Proposed Development	Distance and Direction from the Site
Bryn Henllys	(P/2015/0176)	Consented solar farm development (20MW)	Adjacent to the west

Designated Sites and Habitats

6.6.3 There are no cumulative direct effects on statutory designated sites or their associated qualifying interest species from the cumulative impacts of land take associated with the Bryn Henllys and Bryn Henllys Ext sites.

6.6.4 Similarly given the nature of the Proposed Development which is the same as the consented Bryn Henllys site, land take and associated habitat loss is a small percentage, with construction effects largely temporary and reversible. Such habitat comprises low ecological value agricultural grassland which will be reinstated to provide higher value species diverse meadow grassland through the operational lifetime of both developments. Cumulatively this represents a local gain in species diverse meadow grassland subject to lower levels of disturbance and hence providing positive biodiversity net gain both for the Proposed Development and consented Bryn Henllys site alone, and in combination with one another.

Species

6.6.5 No significant effects on protected or notable species will occur as a result of the proposed development with mitigation measures in place as outlined in relevant topic chapters of the ES (either through considerate design, good practice measures or avoidance, protection and mitigation measures highlighted in Section 6.5).

6.6.6 No significant effects on species were identified from the available documentation in relation to the adjacent development through adoption of similar mitigation

and precautionary good practice measures. As a result, no significant cumulative effects will result from the Proposed Development in combination with this adjacent project.

6.7 SUMMARY

Introduction

6.7.1 The assessment compiles information from a desk study, extended Phase 1 habitat survey and breeding bird survey; enabling the determination of the likely ecological effects of the Proposed Development.

6.7.2 The assessment establishes the likely presence of protected or notable species, identifies statutory designated sites for nature conservation in the vicinity of the Proposed Development, and evaluates the overall conservation status of the Application Site. The potential effects on identified ecological features including designated sites and protected and notable species is assessed in line with current guidance, and appropriate mitigation and enhancement measures are described.

Baseline conditions

6.7.3 An Extended Phase 1 habitat survey was undertaken on the Application Site on the 14th June 2019. The survey recorded habitat within the Application Site and aimed to establish the presence or potential presence of protected and notable species. A Breeding Bird Survey was also undertaken on the 14th June 2019. A variety of species typical of rural areas were recorded singing or showing some evidence of activity within the Application Site including species of conservation value; skylark and yellowhammer. The vegetation suitable for nesting bird species on Site is mainly restricted to hedgerows (and associated trees), however, ground nesting species such as skylark and grey partridge may utilise improved grassland for nesting purposes.

6.7.4 Statutory and non-statutory designated sites were identified within a 5km radius of the Application Site using the (MAGIC) website, along with the JNCC and Natural England websites. BIS provided records of protected and notable species and non-statutory designated sites within 2km of the Application Site boundaries. The Application Site does not form part of any statutory or non-statutory designated site for nature conservation but one statutory site designated for its geological features is located 140m to the west of the Site. There are no designated sites of European interests protected for their mobile qualifying interests (e.g. birds or bats) within 10km of the Site. The nearest non-statutory designated site for nature conservation is Pant-y-Brwyn SINC and is located approximately 500m west of the Application Site boundaries. There will be no direct effects on habitats or species within these sites, as construction activity will be contained within the Application Site boundaries.

6.7.5 Habitats within the Application Site are dominated by improved grassland with a small areas of broad-leaved semi-natural woodland to the east of the Site. Fields are bounded by hedgerows with occasional young trees which have negligible bat roosting potential. All the trees will be retained within the Site.

6.7.6 The most optimal habitats within the Application Site, particularly the linear features of hedgerows are likely to provide moderate commuting and foraging opportunities for bats. No fragmentation or severance effects will arise and foraging and commuting opportunities for bats are likely to be improved by the

proposed landscape planting of new hedgerows and species diverse meadow grasslands.

6.7.7 No great crested newts were found within 2km during the desk study. No ponds are present on Site but five water bodies were identified (from aerial and OS maps) with 250m. It was not possible to access any of the five ponds during the Extended Phase 1 habitat survey. Three of these ponds (P1, P2, P3) were however assessed for their amphibian habitat suitability in 2013 as part of a planning application on nearby land and were either dry or had poor suitability[18].

6.7.8 The lack of local records, poor habitat suitability of ponds surveyed previously within 250m, absence of any on-site waterbodies and low value terrestrial habitat within the proposed construction area indicates that it is highly unlikely that great crested newts are present within the Application Site.

6.7.9 Habitat connectivity will be maintained around the Application Site during works through the retention and protection of hedgerow and tree boundary features. The implementation of standard good practice protection measures during the construction works will be sufficient to avoid significant impacts on amphibian and reptile populations potentially present.

6.7.10 Habitats present on Site are suitable for foraging and breeding birds in the form of grassland, hedgerows and trees. If works take place in the bird breeding season, suitable measures will be required to be set in place to ensure legal compliance, including pre-construction nest checks, and avoidance of works likely to harm nesting birds or their young, as set out in the Wildlife and Countryside Act 1981 (as amended).

Likely Significant Effects

6.7.11 No **significant** residual effects are anticipated on statutory or non-statutory designed sites or habitats or on protected or notable species, including bats, birds, amphibians or other species in relation to the Proposed Development or in-combination with other proposed developments in the wider landscape.

Mitigation and Enhancement

6.7.12 Mitigation and enhancement measures will include the following:

- A site layout and planting plan that includes species-diverse grassland creation, hedgerow planting and infilling as well as tree planting.
- Pollution prevention and control measures during construction;
- Pre-construction nesting bird checks undertaken if works commence during the breeding bird season (generally 1st March to 31st August inclusive);
- A pre-construction badger survey;
- Gaps positioned in the base of the perimeter fence in order to allow mammal species (badger, brown hare and West European hedgehog) to use the habitats on Site
- A minimum of six bat roost boxes and six bird boxes located on suitable mature and semi-mature trees along the Application Sites field boundaries

[18] Unknown Site Title (2015) *Environmental Statement* LDA Design Consultancy LLP, London

Conclusion

6.7.13 The Proposed Development, following the adoption of the proposed mitigation and enhancement measures, will not have significant adverse effects on any statutory or non-statutory site designated for nature conservation, nor on habitats or protected and notable species.

Table 6.11: Summary of Effects, Mitigation and Residual Effects.

Receptor / Receiving Environment	**Description of Effect**	**Nature of Effect** *	**Sensitivity Value** **	**Magnitude of Effect** **	**Geographical Importance** ***	**Significance of Effects** ****	**Mitigation / Enhancement Measures**	**Residual Effects** ****
Construction								
Habitats	Damage to an habitat of Principle Importance	Loss of marshy grassland on Site	National	Negligible	United Kingdom	Negligible	No marsh habitat present on site, more species diverse grassland to be sown.	Negligible
	Habitat loss	Loss of small extents of low value improved grassland	Local	Negligible	Site	Negligible	Landscape planting and habitat creation/diversification and positive management over lifetime of the Solar Farm.	Negligible
	Damage to habitats in and adjacent to Application Site	Indirect damage through construction related pollution	Local	Negligible	Site	Negligible	Standard pollution prevention and control measures	Negligible
Birds, Bats, Hazel dormice, Amphibians, Reptiles & Badger	Habitat Loss	Loss of improved grassland	Local	Negligible	Site	Negligible	Disturbed ground to be sown with a botanically diverse grassland seed mix. Bat and bird boxes to be erected on Site.	Negligible
	Disturbance	Temporary disturbance to	Local	Negligible	Site	Negligible	Pre-construction nest checks by an	

		field boundary features and grassland used as nesting bird habitat Illumination of adjacent bat foraging/commuting corridors	Local	Negligible	Site	Negligible	ecologist if works take place during 1st March -31st August. Construction works only to proceed if ecologist confirms no risk of an offence under the legislation Appropriate lighting design, generally Site will not be lit. Maintenance of dark boundaries along hedgerows	
	Potential harm to individuals	Potential harm to individuals if present in construction area					Good practice measures adopted such as covering excavations and working in daylight hours. A badger pre-commencement survey is required.	
Operation								
Habitats	Damage to habitats	Damage occurring through the cleaning process	Local	Negligible	Site	Negligible	No chemicals to be used, clean with soft brush, using soft clean water with a maximum pressure of 690kPa	Negligible
Birds, Bats, Amphibians, Reptiles & Badger	Disturbance	Disturbance during periodic cleaning and	Local	Negligible if cleaning undertaken outside of	Site	Negligible	Site will be subject to reduced disturbance compared to normal farming practices.	Negligible

		maintenance as well as day to day running of the Site		the breeding bird season Otherwise Low.			New bird and bat box provision as well as grassland creation will benefit species. Dark corridors will be maintained post construction to accommodate commuting bats	
Cumulative and In-combination								
Designated Sites and Habitats	Damage	Direct and indirect from Bryn Henllys and Bryn Henllys Ext Sites	Local	Negligible	Local	Negligible	Local gain in species diversity and lower levels of disturbance, providing biodiversity net gain for the local area.	Negligible
Species	Potential harm and disturbance	During construction and operational phases of both Bryn Henllys and Bryn Henllys Ext Development Sites.	Local	Negligible	Local	Negligible	Mitigation and precautionary good practice measures in place for both Sites.	Negligible

7 CULTURAL HERITAGE & ARCHAEOLOGY

7.1 INTRODUCTION

7.1.1 This chapter considers the likely significant effects upon cultural heritage receptors. It includes consideration of designated and non-designated historic assets, including buried archaeological remains, historic earthworks, structures, landscapes and all other aspects of the historic environment. The Application Site's location and topographic context are depicted on **Figure 7.1**.

7.2 METHODOLOGY

Guidance

7.2.1 This chapter has been informed by the following documentation:

- Planning Policy Wales, Edition 10 (December 2018);
- Technical Advice Note 24: The Historic Environment (TAN24) (May 2017);
- Setting of Historic Assets in Wales (CADW, 2017).
- Standard and Guidance for Historic Environment Desk-Based Assessment (CIfA 2014); and
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment in Wales (CADW 2011).

Consultation

Pre-application advice

7.2.2 Pre-application advice was received from Powys Council on 8 April 2019 (**19/0014/PRE**). Specific to heritage, the response identified the following Grade II Listed buildings within proximity to the Application Site: Henllys Vale Colliery Limekilns and Henllys Vale Colliery Chimney, both located *c.*1.3km north of the Application Site; and Henglyn Isaf early 18th-century farmhouse, located *c.*1.3km east of the Application Site.

7.2.3 No archaeological implications were identified, and it was noted that *CADW did not object to the previous approved scheme*. It was suggested that Setting Assessment be undertaken, and that inter-visibility between the development and the identified Listed buildings be considered.

CADW consultation advice (scoping stage)

7.2.4 CADW provided consultation advice on 26 June 2019. CADW agreed with the scoping report that a DBA should be produced, consistent with the standards and guidance provided by CIfA.

7.2.5 CADW recommended a 3km study area for purposes of setting assessment. They further recommended that Stage 1 of *"The Setting of Heritage Assets in Wales"* be followed in order to identify whether any potential impact might occur to those same assets identified within Powys Council's pre-application advice as well as: Bethel Independent Chapel and a group of five Listed buildings at Heol Giedd, Cwm Giedd, all Grade II Listed.

7.2.6 CADW advised that should any potential impacts be identified as part of Step 1, then susceptible assets should be progressed to Steps 2 to 4 of the assessment, in order to identify the scale of any impact and any appropriate mitigation measures.

CPAT consultation advice (scoping stage)

7.2.7 CPAT provided the following consultation advice on 18 June 2019:

> **"We are in agreement with the scope of assessment set out** [within the EIA scoping report] **which includes a desk-based assessment, field visit and setting impact assessment. The resulting report should be sent to** [CPAT] **for further comment on any impacts identified and mitigation that may be required. A copy of the report should also be sent to the Historic Environment Record.**

7.2.8 The DBA technical report is provided as **Appendix 7.1** to this ES Chapter.

Baseline Data Procurement & Analysis

Data sources

7.2.9 The following key sources were consulted as part of the DBA process:

- CADW, for information relating to designated historic assets;
- Clwyd-Powys Archaeological Trust (CPAT) and Glamorgan-Gwent Archaeological Trust (GGAT) Historic Environment Records (HERs) for information relating to recorded historic assets and previous archaeological works;
- Archival sources, cartographic and documentary;
- Aerial photographs and processed LiDAR imagery;
- Previous published and grey literature reports relating to historic environment investigations undertaken within the Application Site environs; and
- Online resources, including: the Lle Geoportal for Wales; satellite imagery available on GoogleEarth; geological data available from the British Geological survey; soil data available from the Cranfield University Soilscapes Archive; and topographic and environmental data, available as Ordnance Survey Open Source.

Data processing and analysis

7.2.10 A proportionate level of data, sufficient to inform the assessment of archaeological potential, significance and effects, has been acquired from the sources listed in section 7.2.10. All data has been reconciled and analysed in accordance with the relevant industry guidance and best practice, consistent with the objectives of EIA.

7.2.11 All digital spatial data has been interrogated using industry-standard Geographical Information System (GIS) software.

HER data

7.2.12 The results of full commercial data searches were received from Clwyd-Powys Archaeological Trust (CPAT) on 14 June 2019 (Ref: **E6476**), Glamorgan-Gwent Archaeological Trust (GGAT) on 18 June 2019 (Ref: **6056**), and Dyfed Archaeological Trust (DAT) on 22 July 2019 (No Ref).

7.2.13 All of the HER data supplied was reconciled and analysed within the context of the project aims and objectives.

7.2.14 The HER data returned contained numerous records of varying reliability and relevance. Only those recorded sites and events that are of relevance to the

determination of potential, significance and impact in respect of the historic environment are discussed further within this chapter.

LiDAR data

7.2.15 Available LiDAR data was downloaded in composite Digital Surface Model (DSM) and Digital Terrain Model (DTM) format, from the Lle Geoportal for Wales (accessed June 2019). The data was then processed and interrogated using industry-standard GIS software.

7.2.16 Multiple hill-shade and shaded-relief models were created, principally via adjustment of the following variables: azimuth, height, and 'z-factor' or exaggeration. The models created were colourised using pre-defined ramps and classified attribute data.

7.2.17 Due to the lack of tree-cover within the Application Site, the results of the DSM and DTM models were broadly similar, as the 'first return' readings were consistent. Overall, the DTM modelling provided a slightly greater level of contrast.

7.2.18 A DTM shaded relief model is provided within the DBA, with azimuths graduated by 45° intervals from 0-360° (**Appendix 7.1**).

Application Site inspection

7.2.19 An inspection of the Application Site was undertaken in June 2019 in order to **i)** assess the Application Site within its wider landscape context, **ii)** identify/confirm any evidence for previous disturbance within the Application Site, and **iii)** examine any known or suspected historic assets within the Application Site.

7.2.20 The Application Site inspection aspect of the settings assessment was also undertaken during the visit, with those historic assets identified as potentially susceptible to non-physical impact, and their settings, assessed from publicly accessible locations.

Settings Assessment

7.2.21 Setting is defined in TAN24 as:

> **"the surroundings in which [a historic asset] is understood, experienced, and appreciated embracing past and present relationships to the surrounding landscape. Its extent is not fixed and may change as the asset and its surrounding evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect [the] ability to appreciate that significance or may be neutral."**

7.2.22 Setting can thus contribute to, detract from or have a neutral effect upon significance. In addition, whilst a physical or visual connection between a historic asset and its setting will often exist, it is not essential or determinative.

7.2.23 Of particular relevance, TAN24 further provides that:

> **"setting is not a historic asset in its own right but has value derived from how different elements may contribute to the significance of a historic asset."**

7.2.24 As such, any impacts are described within this chapter in terms of how they affect *the significance of a historic asset*, and any heritage values that contribute to that significance, through changes to setting.

Settings assessment methodology

7.2.25 The settings assessment was undertaken in accordance with the industry-standard methodology provided by CADW's *'Setting of Historic Assets in Wales, Guidance Note 3'*[1]. This guidance promotes a 'stepped' (iterative) approach, as follows:

- Step 1 assess which assets would be affected and identify their setting.
- Step 2 define and analyse the settings to understand how they contribute to the significance of the historic assets and, in particular, the ways in which the assets are understood, appreciated and experienced.2
- Step 3 assess the effects of the proposed development, whether beneficial or harmful, on that significance or on the ability to appreciate it.
- Step 4 consider options to mitigate or improve the potential impact of a proposed change or development on that significance.

7.2.26 The following primary resources were used to identify those assets that might have been potentially susceptible to impact as a result of changes to their setting under the current proposals (i.e. **Step 1**):

- the relevant CADW Listing descriptions;
- elevation and contour mapping;
- geological, soil and hydrological mapping;
- modern and historic mapping;
- LiDAR imagery; and
- satellite imagery and aerial photography.

7.2.27 The spatial datasets were processed and analysed using industry-standard GIS software in order to interrogate such factors as building height, line of sight, historic and extant surface features, built form, boundaries, vegetation, roads, and modes of pedestrian and vehicular movement, amongst others. This initial analysis included the creation of an original topographic model. The locations of those assets identified as *potentially* susceptible to indirect impact are presented on **Figure 7.2**.

7.2.28 These assets and their settings were then inspected during a field visit, and the potential for the significance of any to be harmed as a result of changes to setting was disproven. Any further detailed assessment of those unaffected assets (i.e. Steps 2-4) would thus be disproportionate.

7.2.29 With reference to **Figure 7.2**, the intervening distance(s) between each of those assets and the Application Site, the lack of any material inter-visibility between them and the Application Site, the lack of any relevant non-visual association(s) between them and the Application Site, and the lack of any 'third points' from which both would be visible to a material extent within the same view-shed, negates the potential for development within the Application Site to adversely affect their heritage significance.

[1] CADW, 2017. Setting of Historic Assets in Wales.
[2] The guidance includes a (non-exhaustive) check-list of elements that may contribute to a historic asset through setting including: functional and physical relationships, topographic features, physical surroundings, original layout, buried or archaeological elements, views to/from/across, formal or planned vistas, prominence, views associated with aesthetic / functional / ceremonial purposes, historical / artistic / literary / place name / cultural / scenic associations, noise, smell, tranquility / remoteness / wildness.

7.2.30 Similarly, the ability to appreciate the significance of those assets would be unaffected by development within the Application Site of the nature and on the scale proposed. The key contributing heritage values to the significance of those heritage assets, the ability to appreciate their significance, and all key views towards, from and including them, would be preserved.

Assessment methodology

7.2.31 The assessment has considered the following in respect of each identified historic environment receptor (asset):

- the asset's significance;
- the anticipated **level of harm** to that significance (comparable to 'magnitude'); and
- whether that level of harm would comprise a **significant effect**.

7.2.32 Determination of each of the above has been undertaken in accordance with a robust methodology, formulated within the context of current best practice, recent case law, the relevant statute and policy provisions, and professional guidance. The rationale for each is set out within the following three sections, alongside the relevant criteria and terminology used in their articulation.

Determining Significance

7.2.33 In accordance with the levels of significance articulated in PPW10 and TAN24, three levels of heritage significance are identified and have been utilised for the purposes of this chapter. These are presented in **Table 7.1**.

Table 7.1 Heritage significance

Significance	Qualifying Criteria
Designated historic assets	Scheduled Monuments, Listed buildings (Grade I, II* and II), Registered Parks and Gardens (Grade I, II* and II), Registered Historic Landscapes ('Outstanding' or 'Special'), World Heritage Sites, and Conservation Areas.
Non-scheduled nationally important archaeological remains	Archaeological remains that are not designated but are still considered to be of a level of significance commensurate with that of a Scheduled Monument.
Non-designated historic assets	Assets of less than national importance, including any *of special local interest*.

7.2.34 Sites, buildings or areas that have **no heritage significance** would not be considered heritage assets under the provisions of the PPW10 (2018) and TAN24 and so are not considered to be heritage receptors for the purposes of this assessment.

Determining Level of Harm to Heritage Significance

7.2.35 Effects upon the significance of known and potential historic assets identified within the Application Site have been determined with reference to **'harm'** and/or **'benefit'**, as defined within PPW10 (2018).

7.2.36 The identification of harm would apply where the Proposed Development would be anticipated to reduce an asset's heritage significance.

7.2.37 The identification of benefit would apply where the Proposed Development would be anticipated to enhance (increase) heritage significance.

7.2.38 The over-riding provision within PPW10 in relation to harm to designated assets (and non-designated assets of equivalent significance) is that there should be a presumption in favour of:

- the physical preservation *in situ* of Scheduled archaeological remains;
- the preservation and enhancement of Listed buildings and their settings, and ensuring consistency with the statutory requirement under s.66(1) of the 1990 Planning Act;
- the preservation or enhancement of the character or appearance of conservation areas or their settings.

7.2.39 PPW10 also provides that any development effects upon the following are material considerations in the determination of planning applications:

- registered parks or gardens, or their setting; and
- non-designated archaeological remains, with the relative importance of the archaeological remains and their settings to be weighed against other factors, including the need for the proposed development.

7.2.40 Where harm to the significance of a historic asset is identified, the nature and scale of that harm are discussed, and professional judgment used to determine the acceptability of that level of harm within the context of the above policy provisions. This is reflected within **Table 7.2**.

Table 7.2 Level of Heritage Harm / Benefit

Level of Harm / Benefit	Qualifying Criteria & Policy Context
Heritage Benefit	The asset's significance would be enhanced. *This would weigh in favour of the Proposed Development in the planning balance. It would be a desirable outcome, consistent with all key policy objectives and industry guidance provisions.*
No Harm	The asset's significance would be preserved. *This would be consistent with the Planning (Listed Buildings & Conservation Areas) Act (1990) s.66(1) and s.72(1), and the provisions of PPW10.*
Harm to Designated Historic Assets (or to non-designated assets of equivalent significance)	The designated asset's significance would be reduced. *An attempt is made to qualify more precisely the nature and level of harm, with reference to PPW10, TAN24 and the heritage values defined within Conservation Principles (CADW 2011); all determinations are fully qualified within the text.*
Harm to Non-Designated Historic Assets	The non-designated asset's significance would be reduced. *Professional judgment is used in defining the anticipated level of harm to the significance of non-designated historic assets for the purposes of the present chapter; all determinations are fully qualified within the text.* *As per PPW10 paragraph 6.1.25, the relative importance of the archaeological remains and their settings should be weighed against other factors, including the need for the proposed development.*

Assessment of Significant Effects ('Significance of Effect')

7.2.41 In determining whether any identified harm to *heritage significance* would translate into a *significant effect*, this chapter has moved away from a quantitative, matrix-

led approach, as such a method would over-simplify the assessment findings. Instead determinations are based upon professional judgement and are presented qualitatively and with full justification. This approach directly reflects key concepts in current planning policy and heritage guidance.

7.2.42 Ultimately, a statement of whether any identified harm does or does not represent a significant effect is provided in respect of each cultural heritage receptor using the following terminology: **'Significant'** or **'Not Significant'**.

Legislative and Policy Framework

Legislation

7.2.43 Legislation relating to the Built Historic Environment is primarily set out within the Planning (Listed Buildings and Conservation Areas) Act 1990 which provides statutory protection for Listed Buildings and Conservation Areas.

7.2.44 Section 66(1) of the Planning (Listed Buildings and Conservation Areas) Act 1990 states that:

> **"In considering whether to grant planning permission [or permission in principle] for development which affects a listed building or its setting, the local planning authority or, as the case may be, the Secretary of State, shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses."**

7.2.45 With regards to development within Conservation Areas, Section 72 (1) of the Planning (Listed Buildings and Conservation Areas) Act 1990 states:

> **"In the exercise, with respect to any buildings or other land in a conservation area, of any powers under any of the provisions mentioned in subsection (2), special attention shall be paid to the desirability of preserving or enhancing the character or appearance of that area."**

7.2.46 The Historic Environment (Wales) Act was passed in 2016 to give more effective protection to Listed Buildings and Scheduled Monuments, to enhance existing mechanisms for the sustainable management of the historic environment, and to introduce greater transparency and accountability into decisions taken on the historic environment.

7.2.47 Notwithstanding the statutory presumption set out within the Planning (Listed Buildings and Conservations Area) Act 1990, Section 38(6) of the Planning and Compulsory Purchase Act 2004 requires that all planning applications are determined in accordance with the Development Plan unless material considerations indicate otherwise.

National Policy Guidance

Planning Policy Wales, Edition 10 (December 2018)

7.2.48 National policy is set out within the Welsh Government's Planning Policy Wales, Edition 10 (PPW10). PPW10 Chapter 6 deals with the historic environment and its contribution to the Welsh Government's seven well-being goals for a sustainable Wales. Planning Policy Wales emphasises that the positive management of change in the historic environment is based on a full understanding of the nature and

significance of historic assets and the recognition of the benefits that they can deliver in a vibrant culture and economy.

7.2.49 Para 6.1.5 of PPW10 provides that:

> **"The planning system must take into account the Welsh Government's objectives to protect, conserve, promote and enhance the historic environment as a resource for the general well-being... Conservation Principles highlights the need to base decisions on an understanding of the impact a proposal may have on the significance of an historic asset."**

7.2.50 Para 6.1.6 sets out the Welsh Government's specific objectives for the historic environment as follows:

> **● protect the Outstanding Universal Value of the World Heritage Sites;**
>
> **● conserve archaeological remains, both for their own sake and for their role in education, leisure and the economy;**
>
> **● safeguard the character of historic buildings and manage change so that their special architectural and historic interest is preserved;**
>
> **● preserve or enhance the character or appearance of conservation areas, whilst the same time helping them remain vibrant and prosperous;**
>
> **● preserve the special interest of sites on the register of historic parks and gardens; and**
>
> **● protect areas on the register of historic landscapes in Wales.**

7.2.51 In relation to the setting of Listed buildings, paragraph 6.1.10 provides that:

> **"There should be a general presumption in favour of the preservation or enhancement of a listed building and its setting, which might extend beyond its curtilage. For any development proposal affecting a listed building or its setting, the primary material consideration is the statutory requirement to have special regard to the desirability of preserving the building, its setting or any features of special architectural or historic interest which it possesses."**

7.2.52 In relation to Conservation Areas, Paragraph 6.1.14 provides that:

> **"There should be a general presumption in favour of the preservation or enhancement of the character or appearance of conservation areas or their settings. Positive management of conservation areas is necessary if their character or appearance are to be preserved or enhanced and their heritage value is to be fully realised."**

7.2.53 In relation to Historic Parks & Gardens, Paragraphs 1.1.17 and 1.1.18 provide that:

> **"Planning authorities should value, protect, conserve and enhance the special interest of parks and gardens and their settings included**

on the register of historic parks and gardens in Wales. The register should be taken into account in planning authority decision making.

"The effect of a proposed development on a registered park or garden, or its setting, is a material consideration in the determination of planning applications."

7.2.54 In relation to archaeological remains, paragraphs 6.1.23-6.1.25 provide as follows:

"The conservation of archaeological remains and their settings is a material consideration in determining planning applications, whether those remains are a scheduled monument or not.

Where nationally important archaeological remains are likely to be affected by proposed development, there should be a presumption in favour of their physical protection in situ. It will only be in exceptional circumstances that planning permission will be granted if development would result in direct adverse impact on a scheduled monument (or an archaeological site shown to be of national importance).

In cases involving less significant archaeological remains, planning authorities will need to weigh the relative importance of the archaeological remains and their settings against other factors, including the need for the proposed development".

Technical Advice Note 24

7.2.55 Technical Advice Note 24: 'The Historic Environment' (TAN24) provides a detailed supplement to PPW10, and as such is consistent with those national policies. It contains detailed guidance on how the planning system considers the historic environment during development plan preparation and decision making on planning and listed building consent applications. It replaces Welsh Office Circulars 60/96, 61/96, and 1/98.

Local Planning Policy

Powys County Council Local Development Plan (LDP) (2018)

7.2.56 The LDP was adopted on 17 April 2018 and will guide development until 2026. The policy objective relevant to cultural heritage comprises: 'Objective 13 – Landscape and the Historic Environment', specifically:

ii. The Historic Environment

To protect, preserve and/or enhance the distinctive historic environment, heritage and cultural assets of Powys, in particular local assets that are not statutorily protected or designated under national legislation, and to ensure that development respects local distinctiveness.

7.2.57 The Historic Environment is also provided for under the following strategic policies:

Strategic Policy SP7:

'Safeguarding of Strategic Resources and Assets'; and

Strategic Policy DM13:

'Design and Resources'.

Scoping Criteria

7.2.58 This chapter considers the following potential effects:

Construction Phase
physical (direct) effects upon buried archaeological remains, i.e. truncation, and non-physical (indirect) effects upon the significance of historic assets within the Application Site environs as a result of changes to setting;

Operational Phase
non-physical (indirect) effects upon the significance of historic assets within the Application Site environs as a result of changes to setting; and

Decommissioning Phase
physical (direct) effects upon buried archaeological remains, i.e. truncation, and non-physical (indirect) effects upon the significance of historic assets within the Application Site environs as a result of changes to setting.

Limitations to the Assessment

7.2.59 The conclusions presented within this chapter are based upon the baseline conditions (presented below), which are derived in large part from the data held and supplied by the CPAT and GGAT HERs. In establishing the baseline conditions, for the purposes of this chapter, both the accuracy and currency of this data has necessarily been assumed.

7.2.60 In relation to settings assessment, inspection of those heritage assets within the Application Site environs that were identified as potentially susceptible to non-physical impact was undertaken from publicly accessible locations. No privately held lands or properties were accessed.

7.3 BASELINE CONDITIONS

Application Site Description and Context

7.3.1 The Application Site comprises two parcels of land of comparable size, located to the north and south of a tributary of the Afon Twrch (**Figure 7.1**). The land comprises part of a lobe of high ground defined to the west by the Afon Twrch and to the south and east by Nant Gwys; the point of confluence of these two rivers is at Cwm-Twrch Uchaf to the south of the southern land parcel. Cumulatively, both parcels slope to the south-west from a height of *c.*196m AOD to *c.*159m AOD.

7.3.2 The underlying bedrock across both land parcels comprises the South Wales Middle Coal Measures, which has seen extensive exploitation (including within both land parcels) throughout the 19th and 20th Centuries. This is overlain by superficial deposits of glacial (Diamicton) till along the western Application Site boundary. The overlying soils comprise a mixture of loams and clays of low fertility, and post-extraction restored soils of only slightly greater fertility. In general, these soils are best suited to pasture and woodland.

Baseline

Prehistoric (pre-43 AD) & Romano-British (AD 43 - 410)

7.3.3 There are no prehistoric remains recorded within, or within material proximity to, the Application Site. Where evident, prehistoric activity local to the Application Site would appear to have been located on the higher ground to the north / north-east, at an elevation of *c.*200m aOD and above. This includes a concentration of potential Bronze Age huts and a nearby cairn, *c.*550m north-east of the Site (**Figure 7.3**), and a further possible prehistoric settlement still further to the north at Pen-y-Wern. There is no archaeological evidence for the date of these assets, however, and the HER records that they may as well be medieval in date. Known prehistoric ceremonial activity appears otherwise to have been focussed further to the north, along the lower south-facing reaches of the Black Mountains.

7.3.4 In the absence of any recorded prehistoric assets within the Application Site, given the topographic and geological context, and given the history of localised coal extraction on an industrial scale, the potential for any prehistoric remains to survive buried within the Application Site can only be considered low. None would be anticipated.

7.3.5 No Romano-British historic assets are recorded anywhere within the Application Site or its wider environs. As for prehistoric remains, the potential for presently unrecorded Romano-British remains to survive buried within the Application Site can only be considered low. None would be anticipated.

Early Medieval (AD 410 - 1066) & Medieval (AD 1066 - 1539)

7.3.6 There are no early medieval heritage assets recorded within, or within material proximity to, the Application Site. There is no evidence upon which to suggest the potential for such remains to survive buried within the Application Site. The potential for any such remains would be considered very low, and none would be anticipated.

7.3.7 There are no medieval settlement remains recorded within, or within material proximity to, the Application Site, which was evidently in agricultural use at that time. The HER makes reference to the *'-llys'* suffix in Bryn Hen*llys*, and observes that this may indicate the former location of a medieval court. This is disputed, however, not least as the suffix also appears *'-llysk'* / *'-llysg'* in numerous historic documents, resulting in a different translation. While medieval settlement to the east of Cwm-Twrch is plausible, there is presently no archaeological evidence for such within, or within proximity to, the Application Site; both Bryn Henllys and Waun Llwyd were otherwise first documented as part of the Palleg Manor Estate during the mid-18th Century. On balance, the potential for any substantive settlement remains of medieval origin to survive buried within the Application Site would be considered low.

Post-medieval (AD 1539 - 1800) & Modern (post-1800)

7.3.8 Activity within the Application Site during the post-medieval and modern periods is better evidenced than that for previous periods. It is characterised by agriculture and, more latterly, by mining and associated industrial activity. While both were in the ownership of Sir Charles Morgan, the two land parcels within the Application Site formed parts of two discrete holdings at the time of production of the Ystradgynlais parish tithe map in 1844; this arrangement may preserve the distinction between two medieval holdings pre-dating the emergence of Palleg Manor during the later 16th Century.

7.3.9 The southern land parcel comprised much of the land attached to Bryn Henllys farm (*'Brynhenllysg'*) with Rees Morgan in occupation, while the northern parcel comprised much of the land attached to Waun Llwyd farm, with Charles Price in occupation. In terms of agriculture, the land within both Application Site parcels would have been comparatively marginal, and both would appear to have been primarily in use as well-managed pasture on the western margins of a large area of rough grazing on Palleg Hill.

7.3.10 The only recorded non-designated historic asset located within the Application Site comprises the 'Bryn Henllys enclosure', a sub-circular, stone-built enclosure, *c.*15m SW-NE x *c.*20m SE-NW, associated with a later spoil heap / field clearance mound (**Figure 7.3, A**). The earthwork remains of the enclosure are evident on aerial photography, satellite imagery and processed LiDAR imagery (**Appendix 7.1**). The feature was excavated by CPAT and interpreted as either a sheep-fold or a purposefully-dismantled field boundary bank – perhaps related to the coppice enclosure with field barn shown on the First Edition Ordnance Survey Map of 1878 (**Figure 7.3, A**).

7.3.11 Examination of early editions of the Ordnance Survey County Series confirms that agricultural land-use persisted within the Application Site until the late-1950s / early 1960s. At that time, a series of trial shafts were excavated across the adjacent moorland, before a large area, including most of the southern land parcel and the eastern part of the northern parcel were subsumed within an opencast coal mine[3]. Operations appear to have ceased and the areas restored by the late-1980s; but in 1993, permission was granted for opencast mining to resume at Bryn Henllys. This phase of mining activity continued until 2003, following which the land was again restored to agricultural use. It would seem, from the restoration visible on Google Earth satellite imagery of 2006, that virtually the entire site was subject to extraction in the 1990s.

7.3.12 The establishment of this opencast working at Bryn Henllys comprised only the latest iteration of the coal mining industry within Cwm Twrch, and the valleys to the south and west of the site are rich in the later 19th-century remains of that industry. The extent and configuration of the local historic mining industry is discussed by CPAT within their 1995 survey of the opencast works[4]. An impression is also provided on **Figure 7.3**, which depicts the known mining remains within proximity to the Application Site. In particular, historic collieries were associated with the Bryn Henllys, Waun Llwyd, Graig Llwyd and Cwm Clyd coal levels. The Lower Bryn Henllys Colliery does not appear to have extended into the Application Site. Further to the south, mines can also be seen to have been established at Ty-Newydd, Coedffaldon, Hendre Forgan, Bryn-Morgan, Gilfach and New Palleg, on the opposite side of the valley.

7.3.13 Remains of the former mineral railway lines, associated infrastructure and buildings which served the various local collieries also survive; these include a concentration of associated buildings at Mount Pleasant, west of Cwm-Twrch. It may have been this additional construction activity that encouraged the establishment of a brickworks at Bryn Henllys, *c.*130m west of the southern land parcel. A small number of lime kilns are also recorded locally, including those at Pen-y-Wern, to the north of the Application Site.

7.3.14 While no mining remains pre-dating the 1960s opencast works are recorded within the Application Site itself, it is possible that such remains may survive buried within those areas not subject to opencast extraction, i.e. the western margins of the

[3] The extent of the opencast mine is best depicted on the OS 1962-6 County series map.
[4] Thomas, D. 1995. Brynhenllys Opencast, Powys. CPAT. Report prepared for British Coal Opencast: South Wales Region.

southern parcel. No evidence has been identified for surface extraction within the Application Site after 2003, from which point the restored field arrangement is mapped and evident on aerial photography.

Significance of Identified Archaeological Remains

7.3.15 There are no designated archaeological remains, e.g. Scheduled Monuments, or any other designated historic assets located within the Application Site. Neither are there any known non-designated historic assets of equivalent significance to Scheduled Monuments, or any assets of special local interest.

7.3.16 Known and potential non-designated historic assets located within the Application Site comprise:

- the Bryn Henllys enclosure (**Figure 7.3, A**);
- possible remnant modern mining remains along the western Application Site margins; and
- possible agricultural remains of medieval to modern date along the western Application Site margins.

7.3.17 None of these known and potential archaeological remains would be considered historic assets of the highest significance. None would be anticipated to require preservation *in situ*.

Bryn Henllys Enclosure

7.3.18 The Bryn Henllys Enclosure forms a remnant of the livestock-focussed post-medieval / modern agricultural landscape that (possibly) preceded the onset of mining within the valley. As such it may contribute something, albeit modest, to our understanding of the nature and configuration of that historic landscape. That contribution, if any, would derive entirely from the asset's evidential (archaeological) value. However, any such value would be minimal. As demonstrated by the previous trial excavations undertaken by CPAT, such remains would not be considered a significant asset, and the enclosure would not warrant preservation *in situ*.

Possible mining remains

7.3.19 Any remains associated with 19th- / early 20th- century mining may retain a modest level of significance. This would derive entirely from their historic (illustrative) value in enhancing our knowledge of the nature, scale and duration of the mining activity within this area of the Cwm-Twrch valley specifically. Notwithstanding this, as modern mining remains peripheral to the major known centres, the significance of any such non-designated remains would be **very low** by comparison with other types of historic asset, and they would not be anticipated to require preservation *in situ*.

Possible historic agricultural remains

7.3.20 Historic agricultural remains would retain little, if any, evidential value, and would typically be considered to comprise heritage assets of very low, if any, significance. Any earlier examples, e.g. any of medieval origin, might contribute something to our understanding of the arrangement of the pre-enclosure landscape. Such a contribution would be minimal, however, and they would remain non-designated historic assets of **very low** significance, that would not warrant preservation *in situ*.

7.3.21 Any more recent examples (i.e. 20th-century) would be unlikely to retain sufficient heritage significance to be considered historic assets.

7.4 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

Direct Development Effects (i.e. *truncation of archaeological remains*)

Construction

7.4.1 The Proposed Development will comprise the installation of rows of solar panel modules (arrays) standing to a height of *c.*3m. Their installation will require the insertion of piles to support the panels, and the cables linking the panels would be buried in trenches *c.*0.5m wide and *c.*1.0m deep. The cabling would link the panels to inverters, positioned on concrete pads. Access tracks and a small number of sub-stations would also be required; the latter would likely be founded on shallow concrete pads.

7.4.2 Given their finite nature, any development effects upon buried archaeological remains within the Application Site would be direct, long-term, permanent and adverse. Overall, however, the footprint of the Proposed Development can be seen to be so limited in area (only a fraction of 1% of the Application Site by area) that any reduction in the evidential (archaeological) value of any buried archaeological remains, and any adverse effects (harm) to their significance would not be anticipated. This includes any remains associated with non-designated Bryn Henllys enclosure, as well as any historic mining or agricultural remains that might have survived the extensive later 20th-century opencast mining.

7.4.3 Should there be any effect upon archaeological remains during the construction phase, this would result from the insertion of the piles and any associated small-scale excavations and would likely comprise a minimal level of truncation of any such remains. The level of harm that this would result in to the low significance of any such archaeological remains would be, at most, negligible, and **no harm** to the heritage significance of any buried archaeological remains would be anticipated overall.

7.4.4 The direct effect of the Proposed Development upon the heritage significance of those anticipated archaeological remains within the Application site would be considered: **Not Significant**.

7.4.5 It is worth re-iterating that the larger part of the Application Site has already been truncated by later 20th-century opencast mining, and that any remains that may have survived buried within the footprint of the opencast works are likely to have been removed.

Operation

7.4.6 **No harm** to the significance of any identified historic assets would result from the operation phase of the Proposed Development.

Decommissioning

7.4.7 **No harm** to the significance of any identified historic assets would result from the decommissioning phase of the Proposed Development.

Indirect Development Effects (i.e. *as a result of changes to setting*)

Construction, Operation & Decommissioning

7.4.8 The potential for the significance of any historic assets to be harmed as a result of changes to setting has been disproven by the settings assessment undertaken to

inform this ES Chapter. This includes all designated historic assets depicted on **Figure 7.2**.

7.4.9 With reference to the Listed buildings depicted on **Figure 7.2**, the intervening distance(s) between each of those assets and the Application Site, the lack of any material inter-visibility between them and the Application Site, the lack of any relevant non-visual association(s) between them and the Application Site, and the lack of any 'third points' from which both would be visible within the same view-shed, negates the potential for development within the Application Site to adversely affect their heritage significance.

7.4.10 Similarly, the ability to appreciate the significance of those assets would be unaffected by development within the Application Site of the nature and on the scale proposed. The key contributing heritage values to the significance of those historic assets, the ability to appreciate their significance, and all key views towards, from and including them, would be preserved.

7.4.11 With reference to the Scheduled Monuments depicted on **Figure 7.2**, the Application Site does not form a part of the settings of any of these assets such as would be considered to contribute to their significance. The Proposed Development would thus not result in any adverse change to their setting or harm to their significance.

7.4.12 The indirect effect of the Proposed Development (during the Construction, Operation and Decommissioning phases) upon the heritage significance of all historic assets identified as potentially susceptible to indirect harm would be considered: **Not Significant**.

7.5 MITIGATION AND ENHANCEMENT

Mitigation by Design

7.5.1 Given that no significant effects have been identified in relation to any historic assets, either as a result of direct truncation or indirectly as a result of changes to setting, no mitigation by design would be anticipated to be required.

Additional Mitigation

7.5.2 Given that no significant effects have been identified in relation to any historic assets, either as a result of direct truncation or indirectly as a result of changes to setting, no additional mitigation measures would be anticipated to be required.

7.5.3 In relation to the remains of the non-designated Bryn Henllys Enclosure, the previous trial excavations undertaken by CPAT have confirmed the nature, recent date and low significance of this asset. However, should any further mitigation be required by the Local Planning Authority, then archaeological monitoring during the installation of the panels and associated infrastructure within the asset's footprint might allow for the recording of the minimal quantum of physical fabric (if any) to be lost. Any such requirement should be agreed in liaison with the Archaeological Advisor to Powys Council. Given the asset's demonstrably low significance and the minimal anticipated level of truncation, any further mitigation would be entirely disproportionate.

Enhancements

7.5.4 No enhancement(s) would be anticipated to result from the Proposed Development in respect of cultural heritage.

7.6 CUMULATIVE AND IN-COMBINATION EFFECTS

7.6.1 No cumulative effects would be anticipated to result from the Proposed Development in respect of cultural heritage.

7.6.2 No in-combination effects would be anticipated to result from the Proposed Development in respect of cultural heritage.

7.6.3 Specifically, no cumulative or in-combination effects with the scheme immediately to the east of the Application Site (Planning Reference P/2015/0176) – to which the Proposed Development is an extension – have been identified.

7.7 SUMMARY

Introduction

7.7.1 This chapter has considered potential effects upon the significance of cultural heritage receptors. Buried archaeological remains, historic earthworks, structures, landscapes and all other aspects of the historic environment have all been considered.

Baseline Conditions

7.7.2 There are no designated historic assets located within the Application Site. Anticipated non-designated historic assets located within the Application Site comprise Bryn Henllys post-medieval / modern stock enclosure, and possible historic mining and agricultural remains. None of these would be considered historic assets of the highest significance, and none would be anticipated to require preservation *in situ*. Of relevance, the larger part of the Application Site has already been truncated by later 20th-century opencast mining. Any remains that may have survived buried within the footprint of the opencast works are likely to have been removed.

7.7.3 The Application Site does not contribute to the setting or heritage significance of any historic assets within its wider environs. This includes Grade II Listed Henllys Vale Colliery Limekilns, Grade II Listed Henllys Vale Colliery Chimney, Grade II Listed Henglyn Isaf Farmhouse, Grade II Listed Bethel Independent Chapel, the five Grade II Listed buildings at Heol Giedd, Cwm Giedd, and any Scheduled Monuments along the lower reaches of the Black Mountains, north of the Application Site. The significance of all of these assets would be preserved under the proposals.

Likely Significant Effects

7.7.4 No significant effects have been identified, either as a result of direct truncation of archaeological remains or indirectly as a result of changes to setting.

Mitigation and Enhancement

7.7.5 Given that no significant effects have been identified in relation to any heritage assets, either as a result of direct truncation or indirectly as a result of changes to setting, no mitigation measures would be anticipated to be required.

7.7.6 In relation to the Bryn Henllys enclosure, previous trial excavations undertaken by CPAT have demonstrated the recent date and low significance of this asset. Should any mitigation be required by the Local Planning authority, anything more than archaeological monitoring during panel installation within the asset's footprint would be disproportionate.

Conclusion

7.7.7 This chapter has not identified anything in respect of cultural heritage that would preclude development of the nature and on the scale proposed within the Application Site. The Proposed Development would be consistent with the provisions of the Planning (Listed Buildings and Conservation Areas) Act (1990) Sections 66(1) and 72(1), Planning Policy Wales (PPW) Edition 10 (2018), and all relevant Local Plan policies.

7.7.8 The Proposed Development would be acceptable in respect of cultural heritage. **Table 7.3** provides a summary of effects, mitigation and residual effects.

Table 7.3: Summary of Effects, Mitigation and Residual Effects.

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
Construction								
Bryn Henllys post-medieval / modern stock enclosure	Possible very limited truncation, e.g. as a result of pile insertion or cable trench excavation	Direct, Permanent	Non-designated historic asset of low significance	Possible very limited truncation	n/a	Not significant	None	No residual effect
Possible C19 / early C20 mining remains	Possible very limited truncation, e.g. as a result of pile insertion or cable trench excavation	Direct, Permanent	Non-designated historic asset of low significance	Possible very limited truncation	n/a	Not significant	None	No residual effect
Possible historic agricultural remains	Possible very limited truncation, e.g. as a result of pile insertion or cable trench excavation	Direct, Permanent	Non-designated historic asset(s) of low, if any, significance	Possible very limited truncation	n/a	Not significant	None	No residual effect
Operation								
All designated historic assets within 3km of the Application Site	None	Indirect, Temporary	Designated historic assets of national importance	None	n/a	Not significant	None	No residual effect

8 TRANSPORT AND ACCESS

8.1 INTRODUCTION

8.1.1 This chapter assesses the traffic and transport related effects relating to Proposed Development during the construction, operational and decommissioning phases. It complements a Construction Traffic Management Plan (CTMP), which is reproduced in full at **Appendix 8.1**.

8.1.2 The main traffic and transport related environmental effects will be associated with the movement of heavy goods vehicles (HGVs) to and from the Application Site during the construction phase of the Proposed Development. The assessment of the effects of construction traffic will consider the implications for pedestrians, cyclists and horse riders, as well as the effects on the road network.

8.1.3 Solar Farms when operational do not give rise to significant traffic movements and therefore the operational phase of development is not expected to result in any significant environmental effects in terms of traffic generated.

8.1.4 Solar Farms are generally considered to have a design life of 25-40 years, and accordingly the transport implications of decommissioning the Solar Farm at the end of this period are considered.

8.1.5 This chapter sets out the assessment methodology and the consultations undertaken. It then focuses on the existing environment in transport terms and describes the proposed routes for construction and decommissioning vehicles. It then sets out the likely transport environmental effects arising from the proposals, the mitigation measures to reduce significant effects and the likely residual effects after these measures have been implemented.

8.2 ASSESSMENT APPROACH

8.2.1 This section outlines: the methodology for the assessment of the effects of the Proposed Development; the policy and legislative framework which informs the assessment of Bryn Henllys Extension; and the overall scope of the assessment.

Methodology

8.2.2 This assessment has been based upon the IEMA Guidelines for the Environmental Assessment of Road Traffic, 1993 (the IEMA Guidelines) (Ref 8.1). The IEMA Guidelines suggest in Paragraph 3.15 that the assessment should:

> **"Rule 1: include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%)**
>
> **Rule 2: include any other specifically sensitive areas where traffic flows have increased by 10% or more."**

8.2.3 These rules-of-thumb form the starting point for the assessment of effects. Paragraph 3.16 of the IEMA Guidelines comments that projected changes in traffic flows of 10% or less create no discernible environmental impact. Paragraph 3.20 explains that sensitive locations under Rule 2 include accident black-spots, conservation areas, hospitals, and routes with high pedestrian flows.

8.2.4 These rules form the starting point for the assessment of effects.

8.2.5 The significance of the effects of the proposals will be considered in respect of the following, based upon the IEMA Guidelines:

- Severance
- Driver Delay
- Pedestrian Delay and Amenity
- Fear and Intimidation
- Accidents and Safety
- Hazardous Loads

8.2.6 The magnitude of effects referred to in this chapter has been determined using criteria set out in **Table 8.1**. These differ slightly from the criteria set out in Chapter 2 (Assessment Scope and Methodology), in that there is no allowance for no change, since there will be some change in traffic flow and composition during construction and decommissioning.

Table 8.1: Magnitude of Effects

Effect	Magnitude of the Effect			
	Negligible	**Low**	**Medium**	**High**
Severance	Change in traffic flow or HGV flow of 10% or less	Change in traffic flow or HGV flow of 10% to 30%	Change in traffic or HGV flow of 30% to 60%	Change in traffic flow or HGV flow of over 60%
Driver Delay	No increase in journey time	Increase in journey time of less than 5 minutes	Increase in journey time of 5 to 10 Minutes	Increase in journey time of more than 10 minutes
Pedestrian Delay & Amenity	No increase in journey time / no change in pleasantness of walk	Increase in journey time of less than 5 minutes / noticeable change in pleasantness of walk	Increase in journey time of 5 to 10 Minutes / considerable change in pleasantness of walk	Increase in journey time of more than 10 minutes / pedestrians prefer to avoid the route
Fear and Intimidation	Change in traffic flow or HGV flow of 10% or less	Change in traffic flow or HGV flow of 10% to 30%	Change in traffic or HGV flow of 30% to 60%	Change in traffic flow or HGV flow of over 60%
Accidents and Safety	No significant change to personal injury accident rate	No significant change to personal injury accident rate	Personal Injury accident rate changed but below national average	Personal injury accident rate changed and above national average
Hazardous Loads	No increase	No increase	Increase of less than 10%	Increase of more than 10%

8.2.7 These thresholds have been derived with reference to the IEMA Guidelines, best practice, and professional judgement (particularly in relation to the effect of driver delay caused by any temporary road closures).

Assessment of Significance

8.2.8 The overall significance of the effects is defined as follows:

- Neutral No noticeable effect on the locality
- Minor Perception of worsening conditions e.g. increase in delay

- Moderate — Increased perception of worsening conditions, may require temporary change to off-site infrastructure
- Major — Change requiring permanent modifications to off-site infrastructure

8.2.9 In addition, the predicted effects are identified as beneficial or adverse, and as temporary or permanent.

8.2.10 The significance of the effects is also assessed in relation to the sensitivity of the receptor. For example, the effects would be more significant for a community through which a route passes than for a community that is bypassed; and more significant for pedestrians on a route that is shared with traffic than for pedestrians on a separate footway or footpath. The scale is derived from the interaction of receptor sensitivity and magnitude of the effects, as detailed in the **Table 8.2**.

Table 8.2: Significance of Effects

Magnitude of Change	**Sensitivity of Receptor**				
		High	**Medium**	**Low**	**Negligible**
	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor to Moderate	Negligible
	Low	Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

8.2.11 Moderate or major effects are considered significant for the purposes of the EIA Regulations.

Legislative and Policy Framework

8.2.12 This assessment has been carried out with regard to the national, regional and local transport planning policy context summarised below.

8.2.13 At a national level, Planning Policy Wales (PPW) (Ref 8.2), is principally aimed at reducing impacts of development. Much of the guidance is not therefore directly related to a development of this nature, which does not generate any significant travel demand during operation. However, the guidance seeks to ensure that people are able to travel safely and this consideration is particularly relevant during the construction phase. Paragraph 5.9.18 also specifically refers to mitigating or compensating adverse impacts of renewable and low carbon energy development, including effects on the transportation network.

8.2.14 TAN 18 (Ref 8.3) is more relevant to urban development that generates traffic and the associated issues of accessibility and parking. Operational solar farms do not generate significant permanent increases in traffic although traffic will be generated during the construction stage.

8.2.15 Paragraph 3.11 confirms that development in rural locations should embody sustainability principles balancing the need to support the rural economy, whilst maintaining and enhancing the environmental, social and cultural quality of rural areas.

8.2.16 Local policy is set out in the Powys Local Development Plan (2011-2026), adopted in April 2018 (Ref 8.4), whilst more specific guidance on renewable energy is set out in Supplementary Planning Guidance: Renewable Energy, adopted in April 2019 (Ref 8.5), including identifying specific policies to be considered with respect to renewable energy. Policy RE1 is specific to renewable energy, but does not directly refer to transport, but should be read alongside other policies including policies SP7 and DM13.

8.2.17 Strategic Policy SP7 deals with Safeguarding of Strategic Resources and Assets and states development proposals should not have an unacceptable impact on assets and their operation, including National Trails, Public Rights of Way Network, Recreational Trails and the National Cycle Network.

8.2.18 Policy DM13 deals with design and resources and states at paragraph 10 that:

> **"The development has been designed and located to minimise the impacts on the transport network - journey times, resilience and efficient operation - whilst ensuring that highway safety for all transport users is not detrimentally impacted upon."**

Scoping Criteria

8.2.19 The scope of this assessment follows the scope set out in the 'Environmental Impact Assessment Scoping Report' submitted to PCC in June 2019.

8.2.20 The scope of this assessment is based on the requirements of the National Planning Policy Framework and Planning Practical Guidance: 'Travel plans, transport assessments and statements in decision taking' (Ref 8.4). The CTMP includes:

- An assessment of the existing highway network and conditions;
- Proposed Access Arrangements;
- Traffic Generation during construction and operation; and
- Traffic Management Measures to minimise any effects of Bryn Henllys Extension.

Limitations to the Assessment

8.2.21 The assessment is based on a combination of desktop assessment, direct site observations and review of topographical survey and technical drawings. Traffic data has been based on 2017 data from a traffic count census point rather than a traffic count, however it is considered that traffic flows would not have fluctuated significantly since 2017, therefore provides suitable data. Application of traffic data should also be taken in the context that Powys County Council previously considered the traffic impact from Bryn Henllys Solar Farm not to be a problem given other activities along Palleg Road.

8.3 BASELINE CONDITIONS

Site Description and Context

8.3.1 The approved Bryn Henllys solar farm is located immediate east of the southern parcel of the Application Site, with access to Bryn Henllys Extension proposed through Bryn Henllys solar farm.

8.3.2 The approved Bryn Henllys solar farm is referred to as Bryn Henllys solar farm, whilst the Proposed Development is referred to as Bryn Henllys Extension.

8.3.3 Bryn Henllys solar farm, takes access from the existing access from Palleg Road. This existing access was used for the previous open cast minerals extraction which ceased in 2003, as such is of a standard and scale to accommodate regular HGV traffic.

8.3.4 The same construction access will be used for Bryn Henllys Extension as for Bryn Henllys solar farm, with materials transferred through Bryn Henllys solar farm and Bryn Henllys Extension using telehandlers. The construction of Bryn Henllys Extension would be undertaken at the same time as Bryn Henllys solar farm, by means of an extended construction period. Bryn Henllys Extension construction would take approximately 3 months.

Baseline Survey Information

8.3.5 The descriptions of the existing transport network have been obtained from a site visit and from photography available on Google Earth.

8.3.6 Information on existing traffic flows has been obtained from a DfT manual count point (Site: 951290) in Palleg Road.

8.3.7 Information on public rights of way in the area has been obtained from Powys County Council.

8.3.8 The surrounding local transport network has been examined in the context of delivering components, plant and construction materials to the site and for the workforce associated with the construction of Bryn Henllys Extension.

8.3.9 Palleg Road and Cwmphil Road form the study area on the basis that, whilst the average daily number of construction and delivery vehicles to and from the site is expected to be low, there is potential for the threshold set out in Rule 2 to be exceeded during peak delivery periods.

Local Highway Network

8.3.10 The existing access with Palleg Road is a wide formally surfaced access, which previously provided access to the open cast mine. Gates are set back approximately 18m from the edge of Palleg Road, which lead to an existing area of hardstanding of approximately 35mx45m.

8.3.11 The width of Palleg Road is variable along its length however the road is of a good standard and currently carries both large agricultural vehicles and vehicles associated with a waste recycling plant. Palleg Road also provides access to some residential dwellings at its southern end, Celtic Minor Golf Club, a recycling and household recycling plant and landfill site and agricultural fields and properties. The road is subject to national speed limit upon leaving Cwm-twrch lsaf. To the south of this point, the road is subject to a 30mph speed limit.

8.3.12 Traffic data on Pallleg Road has been taken from the DfT manual count point (Site: 951290) for 2018. Annual average daily two-way flows were recorded of circa 210 vehicles, of which circa 35 (17%) were HGV's.

8.3.13 At its southern extent, Palleg Road forms a priority junction with Cwmphil Road, which in turn connects the A4068 via a mini-roundabout junction to the south west of the junction with Palleg Road.

8.3.14 The A4068 links to the A4067, which is a high standard route from the M4 Junction 45, approximately 18 kilometres to the south.

Public Rights of Way

8.3.15 There are a number of Public Rights of Way in the vicinity of Bryn Henllys Extension, though none located within the actual fields where solar farm panels and infrastructure would be sited.

8.3.16 Byway open to all traffic (BOAT) No. 7 continues from Palleg Road along the northern boundary of Bryn Henllys solar farm and between the two parcels of Bryn Henllys Extension.

8.3.17 Three public footpaths (28, 116A and 117A) route through Bryn Henllys solar farm connecting with BOAT No 7 to the north, whilst footpath 122A routes along the eastern side of the northern parcel of Bryn Henllys Extension connecting with BOAT No. 7 to the south. Further public footpaths route northeast from the northern corner of Bryn Henllys solar farm (No. 37) and between BOAT No. 7 at the northern corner of Bryn Henllys solar farm, west to footpath 122A.

8.3.18 Existing use of the BOAT and footpaths is typically by farm vehicles, with no other users observed during a site visit, the BOAT and most footpaths are surfaced with scalping or similar surfacing.

Personal Injury Collision Data

8.3.19 Collison information was reviewed using www.crashmap.co.uk for the five year period 01 January 2014 – 31 December 2018. No personal injury collisions occurred in the study area.

8.4 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

8.4.1 Solar farms when operational do not give rise to many traffic movements. The main traffic and transport related environmental effects will be associated with the movement of heavy goods vehicles (HGVs) to and from the Application Site during the construction and decommissioning phases of the Proposed Development.

8.4.2 The construction and decommissioning of the Proposed Development will result in a short-term increase in the local traffic flows and can be split into three main categories as follows:

- HGVs carrying components;
- Internal construction traffic; and
- Workforce traffic.

8.4.3 The operational phase of the Bryn Henllys Extension is not expected to result in any material environmental effects in terms of traffic generated.

8.4.4 At the end of the operational life of the solar farm, it is assumed that the panels will be decommissioned. Decommissioning the site would involve the complete removal of the panels and associated components from the site. The site would then be completely reinstated.

Construction

Evaluation of Potential Effects

8.4.5 Bryn Henllys Extension comprises a solar photovoltaic farm to generate electricity. The solar farm comprises a number of separate components, each of which would be delivered by HGV.

8.4.6 HGVs will be associated with the delivery of materials and components including the perimeter security fence, the solar panel support frames, the solar panels themselves, cabling and ancillary inverters and control equipment.

8.4.7 It is proposed to use the same construction access and compound for Bryn Henllys Extension as for Bryn Henllys solar farm, with materials transferred through Bryn Henllys solar farm and Bryn Henllys Extension by telehandlers. The construction of Bryn Henllys Extension would be undertaken at the same time as Bryn Henllys solar farm, by means of an extended construction period. Bryn Henllys Extension construction would take approximately 3 months.

8.4.8 The construction compound will be available during the construction period to provide a reception area for incoming vehicles, a lay down area for materials, an area for offices and welfare facilities and parking for construction vehicles, staff and visitors.

8.4.9 The volume of traffic which will occur during the construction of the development has been calculated having regard to estimated volumes of materials needed to be imported to the site. These estimates have been based on worst case assumptions so as to consider the maximum potential effects. The estimated breakdown of the delivery of materials, components and construction plant can be summarised as follows:

- Delivery of Mounting Frames 20 deliveries
- Delivery of Modules 35 deliveries
- Delivery of Cabinets 35 deliveries
- Delivery of Cables 30 deliveries
- Plant Equipment/Recycling 80 deliveries
- Delivery of Gravel/Hardcore 50 deliveries
- Total 250 deliveries

8.4.10 It is assumed that plant will be brought to Bryn Henllys Extension at the beginning of the construction period and remain on Bryn Henllys Extension until construction is complete.

8.4.11 Over the 3 month construction period of the solar farm it is it is estimated that Bryn Henllys Extension will typically generate up to 4 HGV deliveries (8 HGV movements) per day. This is a comparable impact to Bryn Henllys solar farm.

8.4.12 It is expected that construction hours of operation will be between 08:00 and 18:00 Monday to Friday and 08:00 and 16:00 on Saturday. Within this period, construction deliveries can be controlled to occur outside peak hours of 08:00-09:00 and 17:00-18:00 to avoid conflict with peak periods on the local highway network on approach to the site.

8.4.13 All workforce vehicles are assumed to be light vehicles (cars, vans or minibuses) and are likely to give rise to approximately 10 vehicle movements at the

beginning of each working day (with a similar number at the end of the day), with occasional movements throughout the remainder of the day.

8.4.14 Trips associated with decommissioning would be less than those associated with construction, since landscaping will remain in place, and the number of HGV trips will therefore be correspondingly reduced.

Assessment of the Significance of the Potential Effects

8.4.15 The significance of the effects of the construction and operational traffic has been assessed against the criteria set out in Paragraphs 8.2.8 – 8.2.11.

Severance

8.4.16 Severance is described in the IEMA Guidelines as follows:

> **"Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. It can also relate to quite minor traffic flows if they impede pedestrian access to essential facilities. Severance effects could equally be applied to residents, motorists or pedestrians."**

8.4.17 During the construction and decommissioning periods, Bryn Henllys Extension will result in an increase in the number of HGVs on Palleg Road and Cwmphil Road. This could result in severance which is low, by reference of **Table 8.1**. The overall significance on these roads will be minor adverse and temporary.

Driver Delay

8.4.18 The increased number of HGVs and other construction and decommissioning vehicles on Palleg Road and Cwmphil Road may result in low driver delay during peak deliveries. No road closures will be required, and accordingly the significance will be minor, adverse and temporary.

Pedestrian Delay & Amenity

8.4.19 Pedestrian Delay & Amenity can be defined as the relative pleasantness of the journey, together with a quantifiable delay.

8.4.20 The effect on pedestrian (and cyclist and horse rider) delay and amenity on public roads is likely to be null because public roads within the vicinity of Bryn Henllys Extension do not have facilities for pedestrian usage and are not part of the national cycle route.

8.4.21 Three Public Rights of Way pass through Bryn Henllys solar farm; all of which are footpaths. BOAT No. 7 currently routes along the existing farm access track, north of Bryn Henllys solar farm and between the northern and southern parcels of Bryn Henllys Extension. Whilst Footpath 122A also routes along the existing farm access track between the northern and southern parcels of Bryn Henllys Extension. Access to all rights of way will be maintained throughout the construction, operational and decommissioning periods of Bryn Henllys Extension.

8.4.22 Although the Public Rights of Way in the vicinity of Bryn Henllys Extension will be kept open during construction, pedestrian amenity in terms of the relative pleasantness of the journey will be affected by the presence of delivery and construction vehicles crossing the routes of the footpaths within Bryn Henllys solar farm and routing along the farm access track along which BOAT No. 7 and Footpath 122A route to Bryn Henllys Extension. This is subjective, but during the times when an construction vehicle is passing the magnitude of the effect is likely to be regarded by any pedestrians present as High and the significance as major and adverse, but will also be temporary.

Fear and Intimidation

8.4.23 A further impact that traffic may have on cyclists and pedestrians is fear and intimidation, which is dependent on factors including the volume of traffic, its HGV composition, and its proximity.

8.4.24 By reference to **Table 8.1**, the effect of a change in traffic or HGV flows of 10% to 30% can be regarded as low, a change of 30% to 60% as medium, and a change of above 60% as high.

8.4.25 The effect on fear and intimidation on Palleg Road and Cwmphil Road during construction and decommissioning will be minor whilst HGVs are passing. The significance of the effect will be minor adverse, but will be temporary and overall have negligible significance due to the sensitivity of the receptor.

8.4.26 The effect on fear and intimidation on Public Rights of Way during construction and decommissioning will be High whilst construction vehicles are passing, or working in the immediate vicinity, due to the low baseline traffic flows. The significance of the effect will be major adverse, but will be temporary.

Accidents and Safety

8.4.27 A Construction Traffic Management Plan (CTMP) has been prepared which will cover the movement of construction vehicles, including relevant mitigation such as delivery time restrictions and construction signage.

8.4.28 There is no reason to believe that HGVs associated with construction of Bryn Henllys Extension will have a significant effect on road safety. As such the effect of the construction and delivery traffic would be expected to be neutral in respect of accidents and safety.

Hazardous Loads

8.4.29 No hazardous loads are associated with the construction, operation or decommissioning of Bryn Henllys Extension. As such the significance of the effect of construction and decommissioning traffic will be neutral.

Operation

8.4.30 As stated above, solar farms when operational do not give rise to significant traffic movements and therefore the operational phase of Bryn Henllys Extension is not expected to result in any material environmental effects in terms of traffic generated.

8.4.31 However, BOAT No. 7 and Footpath 122A route past Bryn Henllys Extension. This could result in a low change in the pleasantness of the walk. The effect would be minor, adverse and permanent.

Decommissioning

8.4.32 The effects during decommissioning will be broadly similar to those during construction, however as landscaping will remain they will be slightly lessened.

8.5 MITIGATION AND ENHANCEMENT

Mitigation by Design

8.5.1 The design of Bryn Henllys Extension includes mitigation measures which seek to address the main operational effects of Bryn Henllys Extension.

8.5.2 To minimise any visual impact upon Public Rights of Way during operation of the solar farm, the Public Rights of way will be screened from the solar farm by hedgerow/vegetation set back from the Public Rights of Way.

Additional Mitigation

8.5.3 The CTMP sets out the route and proposals for delivery of materials, plant and labour to and from Bryn Henllys Extension.

8.5.4 It is proposed to use the same construction access for Bryn Henllys Extension as for Bryn Henllys solar farm, with materials transferred through Bryn Henllys solar farm and Bryn Henllys Extension using telehandlers. The construction of Bryn Henllys Extension would be undertaken at the same time as Bryn Henllys solar farm, and would take approximately 3 months.

8.5.5 In line with Bryn Henllys solar farm, it is proposed to implement a 'call-on' system whereby construction vehicle drivers will arrive at a layby on the A4067 at Glantawe Riverside Park, to the east of Pontardawe which is approximately 10km to the south of the site. Drivers will then call the site manager to announce their intention to access the site. The site manager will ensure that no other construction traffic seeks to enter or exit the site compound at the same time, to minimise vehicle conflict.

8.5.6 In line with Bryn Henllys solar farm, construction hours will be between 08:00 and 18:00 Monday to Friday, and between 08:00 and 16:00 Saturday.

8.5.7 Deliveries will be scheduled to take place outside of the morning and evening peak hours (08:00- 09:00 and 17:00-18:00) to avoid conflict with peak periods on the local highway network on approach to the site.

8.5.8 During the construction period, delivery vehicles accessing the compound area and construction vehicles accessing the various parts of the site would travel at slow speeds. Drivers of construction and delivery vehicles will be made aware of the potential for members of the public to be using the PROW routes and informed that they must give way to rights of way users at all times. Equally, users of the Public Rights of Way network will be warned of construction traffic through the use of appropriate signage.

8.5.9 At night the construction fencing will ensure that no users of the PROW stray into the construction site.

8.5.10 The existing surfacing of the access road from Palleg Road to the compound area and that of the compound area itself will enable construction and delivery vehicles to access and egress the site without transporting mud and debris onto the public highway.

8.5.11 A Decommissioning Management Plan will be prepared for the decommissioning of Bryn Henllys Extension as required.

8.5.12 Mitigation measures are summarised in **Table 8.3**.

Table 8.3: Mitigation

Ref	Measure to avoid, reduce or manage any adverse effects and/or to deliver beneficial effects	How measure would be secured		
		By Design	By S.106	By Condition
1	Landscape to minimise visual impact	X		
2	Construction Traffic Management Plan			X
3	Decommissioning Management Plan			X

Residual Significant Effects

8.5.13 Moderate and major effects are considered significant for the purposes of the EIA regulations. Following mitigation, the likely residual significant effects of Bryn Henllys Extension are summarised below and in **Table 8.4**.

8.5.14 There is expected to be a moderate adverse effect on pedestrian delay and amenity on the PROWs in the vicinity of Bryn Henllys Extension due to construction vehicle movements. This effect will be temporary and will occur during the construction and decommissioning periods of Bryn Henllys Extension. These periods are expected to last only 3 months and so will be temporary in nature.

8.5.15 There is expected to be a moderate adverse effect on fear and intimidation on the PROWs in the vicinity of Bryn Henllys Extension due to construction vehicle movements. This effect will be temporary and will occur during the construction and decommissioning periods of Bryn Henllys Extension.

8.5.16 There is expected to be no significant effect on accidents and safety on the local road network, or on the incidence of hazardous loads.

Enhancements

8.5.17 There are no known Enhancements in the context of Transport and Access.

8.6 CUMULATIVE AND IN-COMBINATION EFFECTS

8.6.1 The same construction access will be used for Bryn Henllys Extension as for Bryn Henllys solar farm, with materials transferred within Bryn Henllys solar farm and Bryn Henllys Extension using telehandlers. The construction of Bryn Henllys Extension would be undertaken at the same time as Bryn Henllys solar farm, and would take approximately 3 months.

8.6.2 The effects during construction will be comparable to Bryn Henllys solar farm, though over an extended construction period. There will however be no cumulative effects.

8.7 SUMMARY

Introduction

8.7.1 An assessment has been undertaken of the likely significant effects that Bryn Henllys Extension would have with respect to traffic and transport. The effect of Bryn Henllys Extension on the local transport network has been assessed and mitigation measures proposed.

8.7.2 Solar farms when operational do not give rise to many traffic movements, and the main transport effects will therefore be associated with HGV traffic during construction and decommissioning. This assessment is supported by a Construction Traffic Management Plan.

Assessment Approach

8.7.3 The assessment has been carried out with regard to national and local transport planning policy. It has been based upon the IEMA Guidelines for the Environmental Assessment of Road Traffic, 1993.

Baseline Conditions

8.7.4 The approved Bryn Henllys solar farm is located immediate east of the southern parcel of Bryn Henllys Extension, with access to Bryn Henllys Extension proposed through Bryn Henllys solar farm.

8.7.5 Bryn Henllys solar farm, takes access from the existing access from Palleg Road, which connects with the A4068, via Cwmphil Road. This existing access was used for the previous open cast minerals extraction which ceased in 2003, as such is of a standard and scale to accommodate regular HGV traffic.

8.7.6 There are a number of Public Rights of Way in the vicinity of Bryn Henllys Extension, though none located within the actual fields where solar farm panels and infrastructure would be sited.

8.7.7 Byway Open to all Traffic (BOAT) No. 7 continues from Palleg Road along the northern boundary of Bryn Henllys and between the two parcels of Bryn Henllys Extension.

8.7.8 Three public footpaths route through Bryn Henllys solar farm connecting with Byway No 7 to the north, whilst footpath 122A routes along the eastern side of the northern parcel of Bryn Henllys Extension connecting with BOAT No. 7 to the south. Further public footpaths route northeast from the northern corner of Bryn Henllys solar farm and between Byway No. 7 at the northern corner of Bryn Henllys solar farm, west to footpath 122A.

Assessment of Likely Significant Effects

8.7.9 The same construction access will be used for Bryn Henllys Extension as for Bryn Henllys solar farm, with materials transferred through Bryn Henllys and Bryn Henllys Extension using telehandlers. The construction of Bryn Henllys Extension would be undertaken at the same time as Bryn Henllys solar farm, by means of an extended construction period. Bryn Henllys Extension construction would take approximately 3 months.

8.7.10 Over the 3 month construction period of the solar farm it is it is estimated that Bryn Henllys Extension will typically generate up to 4 HGV deliveries (8 HGV movements) per day. This is a comparable impact to Bryn Henllys solar farm.

8.7.11 Construction traffic will impact on Palleg Road, Cwmphil Road, and Public Rights of Way in the vicinity of Bryn Henllys Extension.

8.7.12 There will be an increased in the number of HGVs on Palleg Road and Cwmphil Road. This could result in significant severance and driver delay during construction and decommissioning. Fear and intimidation on Palleg Road and Cwmphil Road during construction and decommissioning will be negligible.

8.7.13 Public Rights of Way (PROW) in the vicinity of Bryn Henllys Extension will be kept open during construction, though pedestrian amenity and fear and intimidation will be affected by the presence of construction vehicles crossing the routes of the footpaths within Bryn Henllys and routing along the farm access track along which BOAT No. 7 and Footpath 122A route. This will result in significant effects for any Public Rights of Way users during construction and decommissioning.

8.7.14 The effect of the construction and delivery traffic is expected to be not significant in respect of accidents and safety.

8.7.15 Solar farms when operational do not give rise to significant traffic movements. However, BOAT No. 7 and Footpath 122A route past Bryn Henllys Extension. This could result in a significant change in the pleasantness of the walk.

Mitigation and Enhancement

8.7.16 The Construction Traffic Management Plan sets out the route and proposals for delivery of materials, plant and labour to and from Bryn Henllys Extension. It covers mitigation including management of deliveries, delivery time restrictions, construction warning signs and management of Public Rights of Way to minimise construction based traffic impacts. The effects following mitigation are minimised but are still significant though only temporary during construction, with the exception of driver delay on Palleg Road and Cwmphil Road which will be negligible.

8.7.17 To minimise any visual impact upon Public Rights of Way during operation of the solar farm, the Public Rights of way will be screened from the solar farm by hedgerow/vegetation set back from the Public Rights of Way. The effect following mitigation is negligible.

Cumulative and In-combination Effects

8.7.18 The construction of Bryn Henllys Extension would be undertaken at the same time as Bryn Henllys solar farm, and would take approximately 3 months.

8.7.19 However the effects during construction will be comparable to Bryn Henllys solar farm, though over an extended construction period. There will however be no cumulative effects.

Conclusion

8.7.20 Adopting best practice construction management the effect of construction of Bryn Henllys Extension will be minimised. The effect of Bryn Henllys Extension long-term during operation on local roads and PROW will be negligible.

Table 8.4: Summary of Effects, Mitigation and Residual Effects.

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
Construction								
Palleg Road and Cwmphil Road	Severance – HGV deliveries	Temporary	Low	Low	Local	Minor Adverse	-	Minor adverse
Palleg Road and Cwmphil Road	Driver delay – HGV deliveries	Temporary	Low	Low	Local	Minor Adverse	Construction Traffic Management Plan	Negligible
Public Rights of Way	Pedestrian Delay & Amenity – Construction Vehicle Movements	Temporary	Medium	High	Local	Major Adverse	Construction Traffic Management Plan	Moderate Adverse
Public Rights of Way	Fear & Intimidation – Construction Vehicle Movements	Temporary	Medium to High	High	Local	Major Adverse	Construction Traffic Management Plan	Moderate Adverse
Operation								
Public Rights of Way	Pedestrian Delay & Amenity – Pleasantness of walk	Permanent	Low	Minor	Local	Minor Adverse	Landscaping	Negligible
Cumulative and In-combination								
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

9 HYDROLOGY, FLOOD RISK & SURFACE WATER DRAINAGE

9.1 INTRODUCTION

9.1.1 This chapter has been prepared to assess the effect of the Proposed Development on flood risk and drainage. The intention of the assessment is to quantify whether the Proposed Development would have a detrimental effect upon the water environment and, where necessary, identify mitigation measures for the proposed scheme in accordance with relevant legislation, policies and statutory requirements in respect to hydrology, flood risk and drainage to ensure the residual effect of the scheme is minimised.

9.2 ASSESSMENT APPROACH

9.2.1 This section outlines the methodology for the assessment of the effects of the proposed development; the relevant policy and legislative framework; and the scope of the assessment

Methodology

9.2.2 The methodology for the assessment of the significance of the effects of the Proposed Development involves:

- Describing the legislative and policy background to the Proposed Development in the context of the water environment;
- Establishing a baseline for the Establishing a baseline for the hydrological and hydrogeological environment;
- Identifying and evaluating the likely significant beneficial and adverse effects of the Proposed Development's construction and operation on the water environment;
- Identifying mitigation measures to avoid, reduce or remedy likely significant adverse effects that may arise from the construction or operation of the Proposed Development; and
- Evaluating the residual effects of the Proposed Development after the implementation of the proposed mitigation measures.

9.2.3 The methodology of this chapter draws on the more detailed Flood Consequences Assessment (FCA), contained in **Appendix 9.1**.

9.2.4 The scope of the ES includes an assessment of the (positive and negative) effects associated with both the construction and operational phases of the proposed development. The effect of the proposed development is considered in the context of the wider hydrological environment.

9.2.5 A desk study and an Application Site walkover has been undertaken to establish the baseline hydrology (surface water), flood hazards, and environmental quality of the Application Site (the Site) and its immediate vicinity

9.2.6 The following sources of information have been reviewed to establish the baseline conditions:

- Application Site Layout Plan (See **Figure 3.2** of Chapter 3);
- Ordnance Survey 1:25,000 scale Maps;
- Topographical Survey;

- Natural Resources Wales online database (June 2019);
- British Geological Survey© (2019) NERC online mapping;
- Application Site specific Flood Consequence Assessment (FCA) (contained in **Appendix 9.1**);
- Powys County Council Preliminary Flood Risk Assessment (PFRA) (June 2011);
- An Application Site walkover was undertaken in June 2019;
- Powys County Council Strategic Flood Consequences Assessment;
- Water Framework Directive Cycle 2 (2015-2021) Rivers and Waterbodies;
- Updated Western Wales River Basin Management Plan (RBMP) (2015); and
- Tawe to Cadoxton Management Catchment Summary (2019).

9.2.7 To assess the significance of the effects of the Proposed Development on the water environment a set of threshold criteria have been established based on the interaction between the value and sensitivity of the receptor and the magnitude of change. The threshold criteria have been determined based on planning policy and legislation; industry best practice; and professional judgement.

9.2.8 The criteria to assess the value/sensitivity of the receptor are set out in **Table 9.1** and the criteria to assess the magnitude of the effects are set out in **Table 9.2**.

Table 9.1 Assessment of the Sensitivity of a Receptor

Value/ Sensitivity	**Receptor**
High	National or Internationally Designated Area e.g. Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site, or National Nature Reserve.
	Nationally or Internationally protected species.
	Local residents (persons and property).
	Functional floodplain or flood storage area (Flood Zone 3b).
	Watercourse, waterbody or wetland with 'High' quality.
Medium	Non statutory sites of regional or local importance e.g. Local Nature Reserve (LNR).
	An area at medium risk of flooding (Flood Zone 2 and 3a) and areas benefiting (protected) from flood defences.
	Watercourse, waterbody or wetland with 'Good' or 'Moderate' quality.
Low/ Negligible	An area of low probability of flooding (Flood Zone 1).
	Watercourse, waterbody or wetland with 'Poor' or 'Bad' quality or a Heavily Modified Waterbody (including drainage ditches).

Table 9.2 Assessment of the Magnitude of the Effect

Magnitude	Criteria
Major Adverse	Significant permanent deterioration of water quality, habitat quality or flow characteristics of a watercourse or groundwater resource.
	Significant loss of floodplain storage.
	Increase whole catchment risk of flooding.
Moderate Adverse	Increase in flood risk affecting the Application Site and its immediate vicinity.
	Moderate changes to the habitat quality or flow characteristics of a watercourse.
	Severe temporary reduction in the quality of surface or ground water resources.
	Minor loss of floodplain storage.
Minor Adverse	Minor increase in flood risk to the Application Site.
	Minor changes to habitat quality or flow characteristics of a watercourse.
	Minor local scale reduction in the quality of surface water or groundwater resources, reversible with time.
Neutral	No appreciable impact on surface water drainage regime, water quality, existing flood risk, or groundwater resources.
Minor Beneficial	Some reduction in flood risk for the Application Site and its immediate surrounds.
	Minor local scale improvement to the quality of surface or ground water resources.
Moderate Beneficial	Reduction in local sub–catchment flood risk.
	Moderate local scale improvement to the quality of surface or ground water resources.
Major Beneficial	Reduction in whole catchment flood risk.
	Significant local scale, or moderate to significant regional scale, improvement to the quality of surface or ground water resources.

Assessment Of Significance

9.2.9 The likely significant environmental effects are rated on a seven point scale contained in **Chapter 2: Assessment Scope and Methodology**. The scale is derived from the interaction of receptor sensitivity and magnitude of the effects, as detailed in the matrix below (**Table 9.3**). The shading indicates those significance ratings that are deemed to be 'significant' effects. The effects are judged to be adverse or beneficial and temporary or permanent.

Table 9.3: Significance Matrix

Magnitude of Change	Sensitivity of Receptor				
		High	**Medium**	**Low**	**Negligible**
	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor to Moderate	Negligible
	Low	Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Legislative and Policy Framework

9.2.10 Legislation and Planning Policy relevant to this assessment includes:

- Water Framework Directive [2000/60/EC];
- Groundwater Directive [2006/118/EC];
- Floods Directive [2007/60/EC];
- Flood and Water Management Act 2010;
- Environmental Act 1995;
- Water Resources Act 1991;
- Land Drainage Act 1991;
- Planning Policy Wales (PPW) 10th Edition (2018);
- Technical Advice Note 15 (TAN 15) (2004); and
- Powys County Council Local Development Plan (LDP) (2018).

9.2.11 A number of standards and guidelines, which provide details of assessment methodologies and mitigation techniques were used in completing this assessment. These include:

- Environment Agency Pollution Prevention Guidelines (Numbers 1, 3, 5, 6 and 8);
- Environment Agency Technical Report W5-074A/TR/1E – Preliminary Rainfall Runoff Management for Developments;
- Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors (CIRIA C532, 2001);
- Environmental Good Practice On Site Guide (3rd Ed.) (CIRIA C692, 2010);
- Control of Water Pollution from Linear Construction Projects (CIRIA C648, 2006);
- The SuDS Manual (CIRIA C753, 2015);
- Designing for Exceedance (CIRA C635, 2006);
- Interim Code of Practice for SuDS (National SuDS Working Group, 2004); and
- Environment Agency (2012) Rural Sustainable Drainage Systems (RSuDS).

Scoping Criteria

9.2.12 The scope of this assessment follows the scope set out in the 'Environmental Impact Assessment Scoping Report' submitted to PCC in June 2019.

9.2.13 The scoping response considers the scope appropriate and confirms the FCA and this ES Chapter will focus on groundwater, surface water flooding, sustainable drainage, local flood risk and management.

9.2.14 The scope of this assessment is based on the requirements of Planning Policy Wales and supplementary Technical Advice Notes and the Flood Risk and Coastal Change Planning Practice Guidance. The Flood Consequences Assessment (FCA) includes:

- An assessment of the existing surface water drainage arrangements;
- Potential flood hazards affecting the Application Site and the probability of these occurring, including an assessment of which Flood Zone the development falls within;
- Effects of climate change on flood hazards;
- Flood risk vulnerability classification and flood zone compatibility of the Proposed Development;
- Flood risk management measures; and
- An assessment of offsite impacts and residual risks.

Limitations to the Assessment

9.2.15 The assessment of significance of the effect of the proposed development on the Water Environment is based on the assumption that the baseline data is correct.

9.3 BASELINE CONDITIONS

9.3.1 This section describes the Application Site in the context of the hydrological and hydrogeological environment; and sets the baseline conditions which the potential effects of the Proposed Development can be assessed against.

Site Description and Context

9.3.2 The Afton Twrch, classified as a 'main river', flows from north to south approximately 150m west of the Application Site. A number of drainage ditches intersect the site in conjunction with hedgerows used as agricultural boundaries for adjoining fields. There is a formalised stone lined ditch flowing east, from the west, towards the Afton Twrch. This is not located within the Application Site, however it is culverted under the existing roads that connect the north and south parcels of the Proposed Development. This formalised ditch is deemed to be a heavily modified waterbody and as such has a "Low" receptor value/sensitivity.

9.3.3 The Application Site's topography falls from north-east towards the south-west. The northern parcel of the Proposed Development slopes from a high point of around 196.5mAOD on the northern boundary to approximately 176mAOD along the southern boundary of the northern parcel. The southern parcel falls from a high point of 180mAOD along the north eastern boundary towards a low point of around 161mAOD along the southwestern boundary.

Baseline Survey Information

9.3.4 The British Geological Survey© NERC (2019) online geological mapping indicates that the application site is underlain mainly by South Wales Lower and Middle Coal Measures Bedrock Formations.

9.3.5 From an inspection of the Natural Resources Wales (NRW) Aquifer Designation Map on its website, the site is underlain by a 'Secondary A' bedrock containing permeable strata 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.

9.3.6 The Application Site does not lie within a Groundwater Source Protection Zone.

Flood Risk

9.3.7 A Flood Consequences Assessment (FCA) has been undertaken and is reproduced in **Appendix 9.1**. Flood risks associated with the Application Site are summarised in **Table 9.4** and explained in more detail in the FCA. Based on this detailed assessment the pre-development potential flood risk to the Application Site from all sources of flooding is considered to be low.

Table 9.4 Pre-development Potential Flood Risk from All Sources of Flooding.

Flood Source	Potential Risk	Description
Watercourses	Very Low	The site is located in Flood Zone A/1, which indicates less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
Surface Water	Low	The topography of the land indicates that any overland flow is directed into the existing ditch network away from the site.
Groundwater	Low	The SFCA does not identify any groundwater flooding affecting the site. The underlying geology and existing topography suggests risk of groundwater flooding is low.
Overwhelmed Sewers	Very Low	No sewers are known to cross the Application Site. No incidences of sewer flooding have been therefore recorded in the vicinity of the site.
Artificial Sources	Very Low	The Environment Agency Mapping indicates the site falls in an area with no risk of flooding from the failure of the reservoirs.

Surface Water and Water Quality.

9.3.8 The current scenario allows rainfall to infiltrate into the existing ground, where current underlying conditions permit, with associated evapotranspiration effects. When infiltration capacity is exceeded by rainfall overland flow routes direct runoff into existing drainage regime associated with the Application Site.

9.3.9 NRW River Quality monitoring at the confluence of Afton Twrch and Nat Gwys indicated overall status as 'Good' upstream of the confluence and 'Moderate' overall status downstream based on the Water Framework Directive (WFD) Classification of 2015 and the updated Tawe Catchment Summary from NRW. Both reaches of river indicate chemical status as 'Good'.

9.3.10 WFD Cycle 2 Rivers and Water Bodies in Wales mapping show overall groundwater chemical status as being poor.

9.3.11 Based on NRW Long Term Surface Water Flood Risk mapping a few small areas of elevated Surface Water Flood Risk are located with the northern parcel of the Proposed Development. The mapping appears to not reflect the Application Site's existing topography and hence existing overland flow drainage regime. These areas of elevated surface water flood risk are typically associated with low lying areas when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

9.3.12 NRW state, regarding Surface Water Flooding, that:

> **"This type of flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm.**
>
> **This is based on the best information we have available, such as ground levels and drainage."**

9.3.13 Reviewing the information obtained through the topographical survey and Application Site walkover from June 2019 it is assumed that the data used to generate the Surface Water Flood Maps contains inaccuracies regarding the Application Site's existing ground levels and drainage regime. Therefore, it is assumed that the NWR SWFR does not reflect the surface water risk associated within the Application Site, where sufficient existing ground levels would enable overland flows away from the Proposed Development. As a precautionary measure the Proposed Development will ensure that no sensitive equipment is located within areas associated with elevated flood risk and all panels would be elevated to 800mm above existing ground levels.

9.4 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

9.4.1 This section describes the potential effects of the construction and operation of the Proposed Development.

Construction

Flood Risk

9.4.2 During the construction phase there may be temporary disruption to the Application Site's drainage regime as trenching for the cable connection and installation of the remaining facilities takes place. These could potentially include minor increases in runoff rates, minor disruption of existing overland flow routes and potential soil compaction.

9.4.3 The receptor value and/or sensitivity of the surrounding land and an onsite ditch and local watercourses is 'Low'. The magnitude of the effect of construction of the Proposed Development on surface water flow rates and routes is Low. The significance of the effect of the construction of the Proposed Development on surface water runoff rates and volumes and the resultant flood risk implications in the receiving water bodies without mitigation is considered to be Minor Adverse. These effects are considered to be temporary, and reversible with time.

Water quality

9.4.4 There are a number of substances which could adversely affect surface water quality on the Application Site and in its immediate vicinity as a result of construction activities associated with the grid connection and the Proposed Development. Potentially polluting construction activities include excavation and

groundworks; vehicle operation; machine and plant washing; erosion from temporary vehicle routes and exposed earth; incorrect storage of substances; and accidental spillages. Vandalism of plant and material storage could also be a pollution risk if substances are discharged or if leakage occurs as a result of damage.

9.4.5 Polluting substances could include:

- Fine sediment (e.g. silts and clays);
- Cementitious materials;
- Oil, fuels and chemicals, including lubricants, coolants and hydraulic fluids; and
- Other general wastes including wood, plastics, sewerage and construction aggregate.

9.4.6 These substances may contaminate the underlying ground or downstream watercourses via surface runoff, especially after periods of rainfall.

9.4.7 The significance of the contaminate effects is dependent on the pollution event, the nature of the pollutant, and antecedent conditions. The receptor value and/or sensitivity of the surrounding land, receiving ditch network and local formalised ditch is Low. The magnitude of the above effect could range from Low to Medium Adverse. The effects of potential pollution incidents on local watercourses without mitigation could therefore range from Minor Adverse to Minor to Moderate Adverse. These effects are considered to be temporary, and reversible with time.

Operational

Flood Risk

9.4.8 The Proposed Development could have a negligible effect on the extent of impermeable ground cover and the creation of new impermeable areas as a result of the Proposed Development. These areas are widely distributed around the site allowing for any run-off to be dissipated into the surrounding vegetated ground, allowing for the natural drainage regime to persist.

9.4.9 The area beneath the solar panels will remain grassed. Rainwater falling onto each panel will drain freely onto the ground beneath the panel and infiltrate into the ground at the same rate as it does in its existing greenfield state. Similarly, it can be assumed that any rainwater falling onto the gravel access tracks will soak into the ground beneath or adjacent to the tracks at the same rate that it presently does.

9.4.10 The modifications to the Application Site's drainage regime have a 'Negligible' effect on the risk of flooding both onsite and offsite compared with pre development conditions. The receptor value and/or sensitivity of an onsite ditch and local watercourses is Low and of local property downstream of the site is High. Without mitigation the significance of the effect of the Proposed Development on local flood risk is considered to be Negligible.

Water Quality

9.4.11 Plant containing potentially polluting substances (oil, coolants and lubricants), such as transformers and cables is part of the proposed solar park. There is a risk of leakage or spillage of these materials during the routine maintenance of plant.

9.4.12 There is potential for polluting substances to have a detrimental effect on the water quality of the surface water runoff and consequently the receiving water body. These substances include:

- Spillages from maintenance vehicles;
- Spillages from on-site plant, such as transformers;
- Sediment introduced to the Application Site from vehicle movement;

9.4.13 The significance of any pollution incident will be dependent upon the nature of the pollutant, the nature of the incident, the sensitivity of the receiving environment, and the effectiveness of mitigation measures.

9.4.14 The receiving watercourses and a ditch are not designated for their conservation nature under any national or local designations. The value and/or sensitivity of the receiving local formalised ditch is Low. The magnitude of the above effect could range from Low to Medium Adverse. Therefore the significance of the adverse effects on surface water quality without mitigation could range from Minor Adverse to Minor to Moderate Minor Adverse. These effects are considered to be temporary, and reversible with time.

Decommissioning

9.4.15 The effects during decommissioning will be broadly similar to those during construction.

9.5 MITIGATION AND ENHANCEMENT

9.5.1 Mitigation measures can be divided into avoidance, reduction, compensation, remediation and enhancement. These methods can be achieved through the physical design of the development, and specific management measures.

Mitigation by Design

9.5.2 The design of the Proposed Development includes mitigation measures which seek to address the main operational effects of the Proposed Development on the water environment.

Flood Risk Mitigation

9.5.3 It is considered that the overall existing drainage characteristics of the site are not materially changed as a consequence of the introduction of the solar farm development and therefore the Proposed Development will have a negligible effect on the flood risk. All drainage ditches are retained as part of the development and surface water runoff from the Proposed Development will therefore be intercepted by the existing onsite drainage systems as per pre-development scenario.

9.5.4 At present the proposed development site is used for arable agriculture which requires periodic ploughing of the site. Exposed soil is at a greater risk of erosion compared with a field with covering vegetation and can result in greater runoff. Upon completion of the solar farm the Application Site will be permanently grassed thereby reducing the risk of soil erosion and reducing potential runoff compared with the existing condition.

9.5.5 The provision of swales on the Application Site as part of the proposed Drainage Strategy will provide enhancement to any effects posed by a negligible increase of impermeable areas associated with control equipment as part of the Proposed

Development. The design of the swales is to intercept runoff and encourage depression storage within the features, promoting interception losses by infiltration and evapotranspiration. This is further discussed in the Drainage Strategy contained in the FCA for the Proposed Development within **Appendix 9.1.**

Water Quality Mitigation

9.5.6 The significant storage of fuels, lubricants or chemicals on Application Site is not expected. Adopting best practice construction site management with adequate contingency planning, and following the principles of pollution prevention guidance will reduce the likelihood of spillages and the risk of water pollution.

9.5.7 Site equipment will be routinely checked and maintained to reduce the likelihood of leakages.

9.5.8 Cables will be buried at depths in accordance with NJUG Guidelines to reduce the likelihood of cable strikes.

9.5.9 Swales are considered a practical implementation of Rural Sustainable Drainage Systems (RSuDS) as a means of intercepting runoff and 'slow down flow' with the aim to form 'micro-wetlands' for the benefit of farmland biodiversity and encourage localised recharge of groundwater whilst providing a degree of flood risk betterment. The swales location may also allow for any accidental spillages to be retained, and hence be treated, prior to reaching a watercourse via overland flow routes.

Additional Mitigation

9.5.10 Additional Mitigation measures are required to mitigate the effects of the construction of the Proposed Development.

Construction Mitigation Measures

9.5.11 Only light machinery will be used to install the solar panels and all HGVs will be restricted to the temporary construction compound.

9.5.12 If necessary, to alleviate the effects of any compaction any affected areas will be harrowed and seeded prior to commissioning of the site.

9.5.13 Management control mitigation is proposed during the construction phase. Management control measures will include supervision of construction activities at all stages of the project using appropriately experienced and qualified staff and supervisors with defined environmental responsibilities and strict adherence to Health and Safety Regulations, Codes of Practice, and consent Conditions as stipulated by the Environment Agency and Powys County Council.

9.5.14 Contractors will employ best practice, good housekeeping and adopt the principles set out in the CIRIA Toolbox Talks: Environmental, BS EN 858-2:2003, CIRIA C532, CIRIA C692, CIRIA C648.

9.5.15 Effective contingency plans will be put in place to manage the risk associated with accidents and/or unforeseen circumstances. For example, the use and location of accidental spill kits will be relayed to the construction personnel.

9.5.16 Contractors will use well maintained plant, but likelihood of spills will be reduced through adoption of Pollution Prevention Guidelines.

9.5.17 The significant storage of fuels, lubricants or chemicals on the Application Site is not expected. Any relevant materials will be stored in accordance to the appropriate Pollution Prevention Guidelines to reduce the likelihood of spillage and with an impermeable base and suitable bunding to prevent discharge in the event of spillage and leakage, and the design and location will be in accordance with the Environment Agency's requirements.

9.5.18 A **Table 9.5** below summarises the measures to avoid, reduce or manage any adverse effects and/or to deliver beneficial effects.

Table 9.5 Summary of Mitigation Measures

Ref	Measure to avoid, reduce or manage any adverse effects and/or to deliver beneficial effects	How measure would be secured		
		By Design	By S.106	By Condition
1	Retention of site drainage regime • The Proposed Development respects existing ditches and watercourses and maintains the existing drainage regime. • The vegetation cover will be maintained throughout the lifetime of the development.	X		
2	Best practice construction site management Adopting best practice construction site management with adequate contingency planning, and following the principles of pollution prevention guidance will reduce the risk of water pollution. These can be secured by a Construction Environmental Management Plan (CEMP).			X
3	Addition of Swales The use of swales as part of the Drainage Strategy provides a form of enhancement to deliver enhancements relating to Surface Water Flood Risk and water quality.	X		

Residual Effects of Construction

9.5.19 Adopting best practice construction site management with adequate contingency planning, and following the principles of pollution prevention will reduce the risk of water pollution. The residual effect on water quality as a result of construction activities is considered to be Negligible. The risk of an accidental pollution incident can never be completely removed.

Residual Effects of Operation

9.5.20 The solar farm will not result in a material increase in surface water runoff. Retention of existing drainage characteristics and enhancement of vegetation cover ensure that the Proposed Development has a Negligible effect on local flood risk compared with the pre-development situation.

9.6 CUMULATIVE AND IN-COMBINATION EFFECTS

9.6.1 As discussed above the residual effect of the Proposed Development on hydrology and flood risk is 'Negligible' and the risk of a pollution event affecting water quality is also minimised.

9.6.2 If the effects of the Proposed Development and other developments are considered together the cumulative effect of numerous developments on hydrology and flood risk is also Negligible assuming appropriate mitigation measures are implemented.

9.7 SUMMARY

Introduction

9.7.1 An assessment has been undertaken of the likely significant effects that the Proposed Development would have on the water environment. The effect of the Proposed Development on local flood risk and water quality of nearby watercourses has been assessed and mitigation measures proposed. This assessment is supported by a detailed Flood Risk Assessment.

Baseline Conditions

9.7.2 The Application Site is currently agricultural land, mainly arable with some grassland. The topography varies across the Application Site with a general trend of existing levels falling towards the south/south-west of the Application Site.

9.7.3 A number of drainage ditches intersect the Application Site in conjunction with hedgerows used as agricultural boundaries for adjoining fields. There is a formalised stone lined ditch flowing east, from west, towards the Afton Twrch, this not located with the Application Site however is culverted under the existing roads that connect the north and south parcels of the Proposed Development.

Likely Significant Effects

9.7.4 The construction of the Proposed Development will temporarily disrupt onsite surface water drainage. The resultant flood risk implications on the receiving water bodies without mitigation are considered to be Minor Adverse.

9.7.5 Potentially polluting activities and accidental spillages and leakages may occur during the construction and operation of the Proposed Development which could have an effect on local water quality.

Mitigation and Enhancement

9.7.6 Good site management, adequate contingency planning, application of pollution prevention principles and best practice construction techniques will reduce the risk of a significant water pollution event occurring.

9.7.7 The Application Site has been designed so that it respects, maintains and enchases, through the use of swales, the existing drainage regime. Through maintaining a suitable vegetation cover throughout the lifetime of the development it will protect the existing drainage regime to be retained.

Cumulative and In-combination Effects

9.7.8 If the effects of the Proposed Development and other developments are considered together the cumulative effect of developments on hydrology and flood risk is also 'Negligible' assuming appropriate mitigation measures are implemented.

Conclusion

9.7.9 This chapter demonstrates that the residual impacts of the proposed solar farm development will range between 'Permanent Minor Beneficial' to 'Temporary Minor Adverse'. Any more significant adverse effects have been addressed through the mitigation measures outlined above which minimise the risk of a pollution incident affecting water resources and provide a small degree of betterment with respect to flood risk therefore resulting in no significant effects as a result of the Proposed Development on the Application Site.

9.7.10 **Table 9.6** provides a summary of effects, mitigation and residual effects of the Proposed Development on the Application Site.

Table 9.6: Summary of Effects, Mitigation and Residual Effects.

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
Construction								
Surrounding area, watercourses	Disruption to drainage regime	Temporary	Negligible to Medium	Low to Medium Adverse	Local	Minor Adverse	Swales, Construction Management plan, Landscaping prior to commissioning	Negligible
Surrounding area, watercourses and ecosystems	Potentially polluting construction activities including excavation, vehicle operation, machine and plant washing, erosion from temporary vehicle routes and exposed earth	Temporary	Negligible to Low	Low to Medium Adverse	Local	Minor to Moderate Adverse	Adopting best practice construction site management, Construction Environmental Management Plan	Minor Adverse to Negligible
Surrounding area, watercourses and ecosystems	Spillage or leakage of fuel/ chemicals/ cementitious materials chemicals brought to site by contractors	Temporary	Low to Medium	Low to Medium Adverse	Local	Minor to Moderate Adverse	Adopting best practice construction site management, effective contingency plans Construction Environmental Management Plan	Minor Adverse to Negligible

Operation								
Surrounding area, watercourses and ecosystems	Spillage or leakage of fuel/ chemicals during routine maintenance or from operational equipment or systems such as transformers and cables	Temporary	Low to Medium	Low to Medium Adverse	Local	Minor to Moderate Adverse	Adopting best practice construction site management, effective contingency plans Construction Environmental Management Plan	Minor Adverse to Negligible
Surrounding area, watercourses	Disruption to drainage regime	Temporary	Negligible to Low	Negligible to Low	Local	Minor Adverse	Swales, Construction Management plan, Landscaping prior to commissioning	Permanent Minor Beneficial to Negligible
Cumulative and In-combination								
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

10 GROUND CONDITIONS AND CONTAMINATION

10.1 INTRODUCTION

10.1.1 This Chapter provides an assessment of existing ground conditions and likely significant effects associated with the construction, operation and decommissioning of the Proposed Development in relation to both internal and external receptors.

10.1.2 The chapter includes consideration of baseline information derived from published information sources on geology, hydrology, hydrogeology and contaminated land. Desk-based assessment regarding the natural ground hazards likely to be encountered at the Application Site have also been reviewed as part of this assessment. The likely effects of the Proposed Development on topography, ground stability, soil compaction and soil erosion, re-use of soils, waste soils, and contamination of the Application Site are considered alongside potential effects on sensitive receptors (i.e. human health, controlled waters, and the environment). Where necessary, relevant mitigation and remedial measures are proposed in accordance with relevant legislation, policy and guidance.

10.1.3 This chapter is supported by the following:

- Appendix 10.1 Legislation, Policy and Guidance
- Appendix 10.2 Desk Based Assessment
- Appendix 10.3 Conceptual Site Model
- Appendix 10.4 Relevant Correspondence
- Appendix 10.5 Assessment Methodologies
- Appendix 10.6 Groundwater Reports
- Appendix 10.7 Explosive Ordnance Assessment

10.1.4 The assessment provided in this chapter is informed by the desk-based assessment and supporting figures and appendices outlined above and is therefore not based on any intrusive site investigations. The Applicant has commissioned a Phase 2 ground investigation following the desk-based assessment. The baseline desk study information will inform the ground investigation scope and subsequently, the baseline information will be updated with the findings of the ground investigation. It is anticipated that conditions would be applied to any planning permission to ensure that environmental and human receptors are suitably protected, and that appropriate mitigation would be included in the scope of works following the principles set out in this chapter.

10.2 ASSESSMENT APPROACH

Methodology

10.2.1 This Chapter utilises desk-based assessment to identify existing conditions and any constraints on the Application Site. The scope of this assessment follows the scope set out in the 'Environmental Impact Assessment Scoping Report'[1] submitted to Powys County Council in June 2019.

[1] Pegasus Group (June 2019) Bryn Henllys Extension – Environmental Impact Assessment Scoping Report.

Assessment Methodology

10.2.2 The approach to the assessment comprises:

- Establishing the baseline conditions for the study area with respect to geology, soil and mineral resources, ground stability, hydrology, hydrogeology, contaminated land (including the potential for unexploded ordnance and ground gases) and historical land uses;
- Identification of potential effects on identified resources and receptors from the construction and operation of the Proposed Development;
- Assessment of the significance of likely effects from the Proposed Development;
- Identification of mitigation measures to avoid, reduce or remedy likely significant adverse effects that may arise from the construction or operation of the Proposed Development; and
- Identification of any residual effects.

Guidance

10.2.3 The assessment has been carried out in accordance with the following standards and guidance:

- CIRIA C552 Contaminated Land Risk Assessment: A Guide to Good Practice;
- Guidelines for Environmental Risk Assessment & Management – Green Leaves III;
- CLR11 Model Procedures for the Management of Land Contamination;
- Groundwater Protection Technical Guidance;
- Guiding Principles for Land Contamination;
- BS 5930:2015 The Code of Practice for Site Investigations;
- BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites – Code of Practice;
- National Planning Practice Guidance (NPPG);
- Normal Background Concentrations (NBCs) of Contaminants in English & Welsh Soils;
- National Quality Mark Scheme for Land Contamination Management;
- Contaminated Land Pages on GOV.UK; and
- The Environment Agency's Approach to Groundwater Protection.

Extent of the Study Area

10.2.4 For effects associated with ground contamination sources, receptors within 1 km of the Application Site are considered. The study area for contamination covers the Application Site and extends to the area within 1km of the Application Site. The study area has been selected to consider the movement of potential contaminants of concern in the environment and the connectivity of these contaminants via pathways of migration/exposure to sensitive receptors.

10.2.5 In relation to physical effects, the study area will be the Application Site as defined by the red line boundary shown on **Figure 3.1**

Consultation Undertaken to Date

10.2.6 **Table 10.1** provides a summary of the consultation activities undertaken in support of the preparation of this Chapter. Copies of relevant correspondence are provided in **Appendix 10.4**.

Table 10.1: Summary of Consultation Undertaken to Date

Organisation	Individual(s)	Meeting Date and other forms of Consultation	Summary of Outcome of Discussion
Powys County Council (PCC)	Planning Department / Environmental Team	Email Request for Further Information. Review of Council Records: Environmental Data Search	The Council provided information with regards to potential contaminative features. Within 1 km of the Application Site boundary there are various features are considered as potential contamination sources under the PCC contaminated land strategy. The Council is not able to provide a conclusive opinion on whether the Application Site is 'contaminated' or not.

10.2.7 There no Part IIA sites within the Ystradowen area under the definition of Environmental Protection Act 1990.

10.2.8 As part of the desk study assessment the Local Authority Environmental Health Department were commissioned to provide a review of Local Authority environmental records for the site and local area.

10.2.9 PCC has confirmed that the site is in a 'development high risk area' as defined by the Coal Authority. It is stated that gas protection measures will be required in any buildings onsite.

10.2.10 The council have also identified the potential contamination features within and around the Application Site. This information is presented in **Table 10.2** below.

Table 10.2 Potential Contamination Features

Feature	National Grid Reference	Location
Unknown filled ground, mining & quarrying, mining of coal & lignite	276320, 212440	Approximately 380 m east site.
	275470, 212230	Approximately 550 m south west of site.
	275880, 213050	Approximately 550 m west of site.
Mining of coal & lignite	275950, 212620	Located within the south of the northern site.
Heap, unknown filled ground, quarrying & mining	275720, 212590	Approximately 250 m west of site.
Former Gilfach Colliery	275940, 211490	Approximately 1 km south of site.

10.2.11 The Council holds no known records of unexploded ordnance (UXO) for the Application Site and within a search area of 1 km radius from the Application Site.

10.2.12 The Council holds no known records of groundwater abstraction records for the Application Site or within a search area of 1km radius from the Application Site.

Physical Effects

10.2.13 An assessment of the potential physical effects of the Proposed Development on geology has been undertaken using a qualitative approach considering the effects on topography, soil compaction, soil erosion and ground stability from the construction works and operation of the Proposed Development.

10.2.14 This approach requires an understanding of the anticipated construction works required to complete the Proposed Development including, but not limited to, site clearance requirements, ground improvement proposals, earthworks including temporary stockpiles, cut/fill balance and proposed landscaping, foundation design for structures and construction methods. Details relating to the proposed construction and operation of the Proposed Development are provided in Chapter 3 of this ES.

10.2.15 The baseline information in relation to ground conditions of the study area has been reviewed and considered in the context of construction and operation of the Proposed Development and methods to determine if any effects are likely. These effects have then been assessed using the value of the receptors and magnitude of impact to consider the significance of the effect as discussed further below.

Assessment of Significance

Significance Criteria

10.2.16 To assess the effects of the Proposed Development, a set of threshold criteria have been defined to establish the sensitivity, magnitude and significance of the effects identified.

10.2.17 The sensitivity of receptors is a matter of professional judgement and is taken to be the likelihood that one of the sensitive receptors suffers the effect.

10.2.18 The terms defined in **Appendix 10.5** (summarised supporting methodology) are used to describe the significance of effects, where they are predicted to occur. Effects that are deemed to be significant for the purposes of this assessment are those that are described as being of a moderate or major beneficial or adverse level.

10.2.19 A seven-point scale is utilised to record likely significant effects to provide final significance designation (see **Figure 2.1** – Significance Scale within **Chapter 2**: Assessment Scope and Methodology).

Likely Significant Effects

10.2.20 The assessment considers the likely significant effects that could result from the Proposed Development in relation to ground conditions and contamination including the consideration of the following:

- Potential effects of soil contamination on human health;
- Controlled Waters;
- Natural Ground Hazards; and
- Ground Gases.

10.2.21 The results of the Wardell Armstrong Phase 1 Desk Study report[2] (**see Appendix 10.2**) were used to establish a baseline Conceptual Site Model (CSM) (see **Appendix 10.3**), which is fundamental to the assessment of the Application Site's environmental setting.

10.2.22 The CSM identifies the potential or known sources of contamination, receptors and pathways between the two in accordance with CLR11[3]. Where all 3 aspects are present, or are considered likely to be present (source-pathway-receptor linkage), they are called a Potential Contaminant Linkage (PCL).

Effects not Considered within the Scope

10.2.23 The likely significant effects that have been assessed relate directly to the chemical quality of soil, groundwater and surface water, ground gas and ground subsidence at the Application Site and this Chapter constitutes a qualitive Phase 1 Geo-Environmental & Geotechnical Assessment.

10.2.24 The effect of the Proposed Development on controlled waters has been assessed in relation to contamination only and other issues including flood risk are outside the scope of this assessment.

[2] Wardell Armstrong (June 2019) – Bryn Henllys Extension Phase I Geo Environmental Desk Study, Report Reference: CA11620-001

3 Defra and Environment Agency, 2004. Model Procedures for the Management of Land Contamination, Contaminated Land Report 11.

10.2.25 The effect of the Proposed Development on potential mineral resources at the Application Site has not been considered within the scope of this assessment as it is not defined within a Mineral Safeguarding Area (based on Mineral Resource Maps of Wales4). Furthermore, mapping indicates the absence of superficial deposits in areas of the Application Site.

10.2.26 Although it is known that the Application Site is likely to have some agricultural land value, the Application Site comprises Agricultural Land Classification Grade 4, which is poor quality land in the context of the policy advice in the Planning Policy Wales (PPW) Edition 10 and does not fall within the Best and Most Versatile (BMV) land classification.

10.2.27 Based on a review of available Coal Authority information, it is considered likely that all the extractable/saleable coal has been extracted from the ground.

10.2.28 The effects on soil as a valuable resource has therefore been scoped out and not considered further. The effects of the Proposed Development on geology as a valuable resource is also scoped out of the assessment, as the Proposed Development is unlikely to impact any Local Geological Sites. A Site of Special Scientific Interest (SSSI), named Cwm Twrch, is located approximately 140 m west of the Application Site. This SSSI and the Proposed Development's potential impact on the SSSI is reviewed in further detail within this Chapter.

10.2.29 The aim of a Phase 1 Assessment in relation to this Chapter is to assess the likely significant geo-environmental (contamination) risk and various aspects of geotechnical hazards on the Application Site.

10.2.30 There are overlaps between the scope of this assessment and various other assessments within this ES. The following points should be noted:

- The assessment of likely significant effects on ecological receptors is limited to direct effects from either soil or water contamination (e.g. risks to aquatic life by leaching of contamination into a watercourse). Assessments relevant to other likely significant effects upon ecological receptors are detailed within Chapter 6: 'Biodiversity'; and
- This Chapter does not consider waste management or waste classification of materials at the Application Site. Any required waste management will be addressed by the appropriate regulatory processes and conditions should the proposal be granted planning consent.

10.2.31 There is a statutory requirement that an EIA should consider the vulnerability of the Proposed Development to risks of major accidents and / or disasters. However, due to the nature of the Proposed Development, it is considered that the likelihood of it resulting in /causing an event to occur that threatens severe damage to human health, welfare and / or the environment is very low. Moreover, the likelihood that the Proposed Development will be affected by naturally occurring extreme weather events (i.e. flooding, storms and extreme temperatures beyond that of weather events experienced in the UK) is also very low.

10.2.32 Owing to the above, the vulnerability of the Proposed Development to risk of major accidents and / or disasters has been scoped out of this Chapter.

[4] British Geological Survey (2009) – Mineral Resource Map for Mid Wales (South), https://www.bgs.ac.uk/mineralsuk/planning/resource.html#MRW

Legislation and Policy Framework

10.2.33 The relevant legislation, policy and guidance are listed below, with further details provided in in **Appendix 10.1**.

Legislative Framework

10.2.34 The applicable legislative framework is summarised as follows:

- Control of Pollution Act 1974;
- Health & Safety at Work Act 1974;
- Environmental Protection Act (EPA) 1990: Part IIA;
- Water Resources Act 1991 (as amended);
- Pollution Prevention & Control Act 1999;
- Environment Act 1995;
- Action Programme for Nitrate Vulnerable Zones (England & Wales) Regulations 1998;
- Health & Safety at Work Regulations 1999;
- Control of Substances Hazardous to Health (Amendment) Regulations 2004;
- Control on Dangerous Substances & Preparations (Amendment) (No. 2) Regulations 2007;
- Groundwater (England & Wales) Regulations 2009;
- Control of Asbestos Regulations 2012;
- Contaminated Land (Wales) (Amendment) Regulations 2012;
- Construction (Design & Management) Regulations 2015;
- Planning (Wales) Act 2015;
- The Well-being of Future Generations (Wales) Act 2015;
- The Environment Wales Act 2016;
- Water Environment (Water Framework Directive) (England & Wales) Regulations 2017;
- Water Supply (Water Quality) (Amendment) Regulations 2018;
- Environmental Permitting (England & Wales) (Amendment) (EU Exit) Regulations 2019; and
- Environmental Damage (Prevention & Remediation) (Wales) (EU Exit) Regulations 2019;

Planning Policy

10.2.35 The applicable planning policy is summarised as follows:

- Planning Policy Wales Edition 10 (Dec 2018); and
- Powys County Council Local Development Plan 2011-2026.

Scoping Criteria

10.2.36 The scope of this assessment is as follows:

- A desk-based assessment will be carried out to consider the historical land uses on site and the potential impact on receptors;

- Review copies of the historical topographical mapping – to confirm the former uses of the Application Site and its environs in order to identify potentially contaminative uses (sources);

- Assess geological setting and ground conditions – to identify the ground conditions and geological structure of the Application Site, potential pathways, and sources of contamination;

- Brief review of hydrogeology/hydrology – to identify any potentially sensitive receptors;

- Consider landfill sites – to identify potential sources of contamination (chemical and gaseous);

- Review pollution incidents – to identify records of pollution incidents that could affect the Application Site;

- Review of subterranean gas – to identify whether the Application Site is situated within an area where naturally occurring gases (e.g. Radon and mine gas) could be present;

- Environmental searches will be undertaken, primarily in the form of Groundsure reports (Appendix 10.6) and consultation with the Local Authority. This will enable the development of a robust Conceptual Site Model, which is of fundamental importance in the design of an accurate and cost-effective ground investigation. The strategy would then be agreed with PCC prior to implementation; and

- A site inspection is undertaken to identify nature of surface conditions and visual evidence and potential for ground contamination.

10.2.37 The necessary topics to be included within this Chapter were identified following a review of the Wardell Armstrong Phase 1 Desk Study2.

10.2.38 This Chapter considers the following potential effects:

- Construction Phase – Risk to Human Health;
- Construction Phase – Ground Gas Risk (in relation to impact on Human Health);
- Construction Phase – Risk to Controlled Waters;
- Construction Phase – Ground Stability (in relation to impact on structures);
- Operational Phase – Risk to Human Health;
- Operational Phase – Ground Gas Risk (in relation to impact on Human Health);
- Operational Phase – Ground Stability (in relation to impact on structures);
- Operational Phase – Physical Effects of Proposed Development on Ground Conditions; and
- Decommissioning Phase – Review of Decommissioning Proposed Development.

10.2.39 Furthermore, impacts are likely to be greatest during construction, with reduced impacts likely during operation due to the contamination and physical risks being mitigated through the detailed design.

10.2.40 The review of the decommissioning phase considers the stage at which the Proposed Development reaches the end of its useful life. As such, this aspect covers likely decommissioning requirements and activities.

Limitations to the Assessment and Assumptions

10.2.41 No intrusive investigations or sampling of materials onsite have been carried out as part of this assessment. There is currently no soil, leachate, groundwater, or gas monitoring data available for the Application Site.

10.2.42 It is assumed that the baseline conditions currently present within the Wardell Armstrong Desk Study Report[2] and this Chapter are reflective of those at the commencement of the Proposed Development. Assuming that the current land use doesn't alter, contamination status of the Application Site would not be expected to materially alter prior to the commencement of development. However, this is currently based on qualitative desk study data alone.

10.2.43 The 'reasonably likely worst case' impact has been assumed in the assessment and is sought to be mitigated.

10.2.44 The work undertaken to provide the basis of this Chapter comprised a study of available documented information from a variety of sources as listed within the Wardell Armstrong Desk Study Report[2]. The details given in this Chapter have been dictated by the finite data on which it is based and are relevant only to the purpose for which the Environmental Statement has been commissioned.

10.2.45 It should be noted that risks identified within this Chapter are characterised to the best degree of accuracy based on third party information and definitive risk can only be determined following further ground investigation of the Application Site.

10.3 BASELINE CONDITIONS

Site Description and Context

Site Description

10.3.1 The Application Site is located approximately 1.5km north of Cwmtwrch within the Swansea Valley, South Wales. The Application Site comprises approximately 25.6 hectares of generally restored opencast mining and is currently used as agricultural land. The Application Site is bounded in the west by the River Twrch which runs in a north-east to south-easterly direction. The Application Site is located to the east of Ystradowen village.

10.3.2 The Application Site forms two parcels of land, one to the north of Waun Lwyd Farm (*northern parcel*) and one to the south (*southern parcel*). The two parcels of land are connected by an unnamed road and the Application Site is considered as one portion of land for the purposes of this Chapter. The Application Site comprises entirely of soft standing / vegetation cover.

10.3.3 A more detailed summary of the site description is outlined within Chapter 3.

Site History

10.3.4 The Application Site history has been reviewed with reference to past editions of County Series and Ordnance Survey (OS) mapping provided within the Groundsure reports (included as **Appendix 10.6**). A detailed summary has been provided within the WA Phase 1 Desk Study Report (**Appendix 10.2**).[2]

10.3.5 The Application Site was historically used as agricultural land until 1920 where opencast workings are shown present within the eastern and northern portion of the Application Site and the majority of the southern parcel. The opencast appears to have been restored to agricultural land within the 1970s. Surrounding land use comprises agricultural land and coal mining activity features such as coal pits and levels. Opencast workings extend eastwards from the Application Site in 1920 and are shown as partly restored during the 1970s.

Present Site Use

- The Application Site is currently being utilised as agricultural land.
- A site walk over survey was undertaken on 18 June 2019. The following points are of note:
- Dense vegetation noted along field boundaries comprising a mixture of trees and hedges;
- Hay storage areas noted in the north-west corner of the southern portion of the site and south-west corner of the northern portion as seen in the latest aerial image. Hard standing in the area of hay storage consisted of loose angular dine to coarse gravel of suspected mudstone with high cobble content.

Baseline Survey Information

Geological & Environmental Setting

10.3.6 The assessment of the geology of the Application Site is based on the WA Phase 1 Desk Study Report[2]. The Desk Study Report utilises and refers to data sources such as (but not limited to) British Geological Society (BGS) Geoindex online mapping and Groundsure reports.

- Made Ground

10.3.7 Made ground associated with opencast works is anticipated across the site. Made ground is likely to consist of opencast backfill composed of rockfill and unsaleable Coal Measures mudstone, siltstone and occasional sandstone. The thickness of made ground is likely to vary across the site, it is estimated to be c.<60 m. As part of site restoration following the opencast works a capping layer may have been required. If present, any capping will be of unknown thickness and composition.

- Superficial Deposits

10.3.8 Geological maps indicate the western area of the Application Site to be underlain by Devensian Till (Boulder Clay). Natural superficial deposits are likely to have been removed as part of the opencast mining operations. However, the superficial deposits may have been replaced across the entirety of the Application Site as part of the restoration process.

- Solid Geology

10.3.9 The Application Site is mainly underlain by the Middle Coal Measures which consists of grey coal bearing mudstones/siltstones with seat earth and minor sandstones.

10.3.10 Coal seams recorded to outcrop beneath the Application Site include the Stanllyd Seam (locally known as the "Big" seam). The Stanllyd seam is shown to outcrop within the central part of the Application Site and dips in a north to south direction. The outcrop position correlates with the location of the boundary between the made ground and superficial deposits underlying the Application Site and has likely been extracted as part of opencast mining operations. The thickness of the Stanllyd seam ranges from approximately 1.5 m to approximately 2.1 m.

10.3.11 The Braslyd seam (locally known as the "Brass" or "Peacock" seam) is shown to outcrop adjacent to the north-western boundary of the northern parcel. The thickness of the Braslyd seam is approximately 0.9 m to 1.2 m.

10.3.12 It is anticipated that the strata dips in a south westerly direction although the geological maps indicate that folding and faulting is present. Faulting includes reverse faults that downthrow to the south east and normal faults that downthrow to the west. Faults within the Application Site are of an unknown displacement.

- Hydrogeology

10.3.13 The Groundsure reports indicates the Application Site to be underlain by Superficial Deposits which are classified as a Secondary Undifferentiated aquifer. These deposits are variable in nature and thus difficult to classify.

10.3.14 Hydrogeological aspects pertinent to this assessment are reviewed within this section. Hydrogeology will only be considered in this chapter in terms of a pathway and receptor for contamination. A more detailed overview of hydrogeology and the effect of the Proposed Development on groundwater regime is outlined within Chapter 9 – Flood Risk & Drainage.

10.3.15 The underlying solid strata are classified as a Secondary A Aquifer. Secondary A Aquifers are described by the Environment Agency / Natural Resources Wales (EA / NRW) as being 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.

10.3.16 The Application Site does not lie within a groundwater source protection zone (SPZ) and there are none identified within 500 m of the Application Site. No groundwater abstraction licenses are observed within 1 km of the Application Site.

10.3.17 Four surface water abstraction licenses are noted within 1 km of the Application Site boundary ranging from 437 m north of the Application Site to 777 m east of the Application Site. All surface water abstractions are listed as historical and relate to dust suppression.

- Hydrology

10.3.18 There are four records of watercourses on the Application Site which are classified as inland rivers not influenced by tidal action.

10.3.19 Hydrological aspects pertinent to this assessment are reviewed within this section. A more detailed overview of hydrology is outlined within Chapter 9 – Flood Risk & Drainage.

10.3.20 The Application Site itself lies within Flood Zone 1 – land assessed as having a less than 1 in 1000 annual probability of fluvial flooding in any year (<0.1%).

10.3.21 The nearest 'at risk' floodplain is 104 m north-west of the Application Site, classified as Flood Zone 2. NRW Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea.

10.3.22 The onsite risk of flooding from rivers and the sea (RoFRaS) is recorded as very low and less than a 1 in 1000 chance of flooding in any given year.

10.3.23 BGS groundwater flooding susceptibility areas within 50 m of the Application Site have been identified. Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding). There is potential susceptibility to groundwater flooding at surface (associated with superficial deposits flooding).

- Discharge Consents

10.3.24 The Groundsure report details one licensed discharge consent recorded in association with the Application Site itself regarding the historic Waunlwydd North Opencast Site. The discharge consent related to unspecified discharge to an unnamed tributary of the River Twrch, the discharge consent was revoked in 1992.

10.3.25 A further 5no. discharge consents are recorded within 500 m of the Application Site boundary, ranging from 6 m – 475 m. Only one of the discharge consents retains an effective status, located 312 m south west of the Application Site boundary. This discharge consent is associated with sewer storm overflow water discharged to the River Twrch.

- Potentially Contaminative Land Uses

10.3.26 There is record of ten potentially contaminative industrial sites land uses within 250 m of the Application Site boundary. These comprise a tank of unknown content, unspecified disused mine, a disused refuse tip, slag heaps, and an electricity substation. The closest feature is a tank (of unknown content) located approximately 62 m to the north-west of the Application Site.

10.3.27 There are no fuel station entries recorded within 500 m of the Application Site.

- Landfills

10.3.28 Review of the Groundsure report indicates that there are no records of EA/NRW registered historic landfill sites within 1 km of the Application Site boundary.

10.3.29 There are no records of a landfill from Local Authority and Historical Mapping Records within 1 km of the Application Site.

10.3.30 The Groundsure reports details one waste transfer site within 500 m of the Application Site boundary. The entry relates to a recycling site 417 m north-west of the Application Site boundary.

- Recorded Pollution Incidents

10.3.31 The Groundsure report identifies 9no. entries relating to EA/NRW recorded pollution incidents located within 500 m of the site. None of these records relate to onsite incidents:

10.3.32 The nearest incident was located 199 m to the north-west of the site and relates to a Category 3 (Minor) Impact to air and a Category 4 (No Impact) to land from crude sewage in 2014. Due to the location and magnitude of the incident it is not thought likely that this incident would have had an impact on the Application Site.

10.3.33 Seven records relate to the release of sewage materials (with the most recent incident being recorded in 2016, with the remaining 1no. record relates to the release of firefighting runoff in 2016. Due to the location and magnitude of the incidents it is not thought likely that these incidents would have had an impact on the Application Site.

- Radon

10.3.34 Radon can be a hazard within built developments and especially within enclosed or confined spaces. The Health Protection Agency and British Geological Survey document - Indicative Atlas of Radon in England and Wales[5] provides a summary of the number of homes in a given area which are above the 'Action Level' for radon.

10.3.35 Although the radon atlas relates directly to measurements taken from homes or dwellings, it is also relevant to employers assessing risks for enclosed underground and ground floor work places.

10.3.36 The BRE document, Radon: guidance on protective measures for new buildings[6], provides guidance for reducing the concentration of radon in new buildings and a two-stage procedure using accompanying maps needed to determine the level of protection for a given site.

10.3.37 The Groundsure report details the Application Site is in a Radon Affected area, with between 1-3% of properties displaying records above the action level.

10.3.38 No protective measures are required for new developments at the investigation site.

- Sensitive Sites

10.3.39 Reference to the Groundsure (EnviroInsight) report, included at **Appendix 10.6**, indicates that there is one recorded SSSI within 1 km of the Application Site. The SSSI site is named Cwm Twrch and lies 140 m west of the Application Site and is designated for its geological interest.

10.3.40 Cwm Twrch SSSI is of national and international importance for a sequence of rocks that is of Westphalian A and B (Upper Carboniferous) age and was deposited approximately 320 million years ago.

10.3.41 These rocks form part of the Productive Coal Formation and include non-marine mudstones, sandstones and coal bands, together with a thin band of marine shales. The latter unit has yielded a variety of marine fossils, which

[5] J C H Miles, J D Appleton, D M Rees, B M R Green, K A M Adlam and A H Myers (2007) Indicative Atlas of Radon in England and Wales, Health Protection Agency and British Geological Society

[6] C Scivyer (2015) Radon: Guidance on protective measures for new buildings BR 211, Building Research Establishment

allow geologists to correlate these rocks with other sequences of a similar age exposed elsewhere in northern Europe.

10.3.42 There are no recorded National Nature Reserves (NNR) within 2 km of the Application Site.

10.3.43 There are no recorded Special Area of Conservation (SAC), Special Protection Area (SPA) or Ramsar sites within 1 km of the Application Site.

- Unexploded Ordnance Risk

10.3.44 A preliminary Unexploded Ordnance (UXO) threat assessment (**Appendix 10.7**) has been commissioned as part of this desk study. The assessment was undertaken by Zetica Ltd, who are a specialist in risk mitigation and the removal and management of UXO.

10.3.45 Preliminary review of readily available sources indicates the Application Site is not located at or near World War I or World War II military activity sites (this includes activity sites identified pre- and post-war).

10.3.46 The report displays transport infrastructure and public utilities as strategic targets within 5 km of the Application Site during both WWI and WWII.

10.3.47 During WWII the Application Site was located within the Rural District (RD) of Ystradgynlais, which officially recorded 6no. High Explosive (HE) bombs with a bomb density of 0.3 bombs per 405 hectares. However, no records have been found to indicate that the Application Site was bombed.

10.3.48 The initial assessment undertaken by Zetica Ltd recommends no further action on this site.

Geotechnical Considerations (Natural Ground Hazards)

Soils and Agricultural Land Classification

10.3.49 The LandIS - Land Information System Website[7] indicates that the soils at the Application Site are described as loamy, restored soils mostly from quarry and opencast spoil. The soils are also described as exhibiting variable drainage and low to moderate fertility.

10.3.50 A review of the agricultural land classification map for Wales[8] provides a classification for the Application Site. The mapping identifies the Application Site to be mapped as Grade 4 soils (poor).

Dissolution Hazards

10.3.51 The dissolution of soluble rocks, such as limestones, chalk or halite can generate voids and subsidence at the ground surface. The BGS records the Application Site as having a negligible susceptibility to dissolution hazards.

[7] http://www.landis.org.uk/soilscapes/index.cfm#

[8] http://lle.gov.wales/map/alc

Underground Mineral Extraction

10.3.52 The Groundsure Geo-Insight Report identifies coal mining activities onsite, it also states non-coal mining activities took place within 78 m north west of the Application Site boundary. The non-coal mining commodity is described as iron ore and localised small scale underground mining may have occurred.

10.3.53 Unspecified disused mining and opencast works are detailed within the Application Site boundary on OS mapping from 1965.

10.3.54 Four shafts to the north-west and west of the Application Site are recorded within 100m of the Application Site boundary.

10.3.55 A Coal Mining Risk Assessment (CMRA) has been commissioned for the site. The following information is summarised from the CMRA. Five shafts and 4no. adits are recorded directly within the site foot print and between the north and southern parcels. All 5no. shafts have been removed to the Peacock Seam. The 4no. adits have been removed to the Peacock Seam where they intersect the opencast area. Parts of the adits located within the highwall are likely to remain present.

10.3.56 The Coal Authority interactive viewer states that shallow underground coal mining has taken place in the west of the site. The extent of underground mining at the site is unknown. Information utilised from the WA CMRA outlines that almost the entire investigation site was open cast between c.1995 - c.2003 (a small area within the west is unlikely to have been fully opencast given the boundary of the opencast site). The area in the west of the site where opencast works to the depth of the peacock seam (c.<60 m below existing ground level) were not undertaken is likely to contain remnant coal mine workings at shallow depth.

Shrink / Swell Soils

10.3.57 Higher plasticity clays exhibit high volume change in varying moisture conditions. The presence of such soils may represent an additional risk to development where volume change hazards could lead to differential settlement or ground movements. The Groundsure report details very low potential as the highest hazard rating for shrinking or swelling clay ground deposits.

Compressible Ground

10.3.58 The Groundsure report details a very low potential of compressible ground at the Application Site.

Sensitive Receptors

10.3.59 The following receptors are the sensitive receptors which are included as part of the assessment.

10.3.60 *Site users* – The critical receptors in relation to human health are considered to be construction workers during site development and future site occupiers which in this type of development will be limited to periodic visits by solar farm maintenance staff. However, due to the potential to impact on human health being present, the specified human health receptors are considered to be of moderate receptor sensitivity. Construction workers are considered a potential receptor in relation to potential soil contamination (involving disturbances of

soil during construction) and risk from ground gas, via accumulation in confined spaces or / and trenches. In accordance with the standard industrial CSM, the critical receptor for human health is considered to be 'a working female adult aged 16 – 65 years adult';

10.3.61 *Controlled waters* - The definition of controlled waters includes groundwater, rivers, lakes and ponds. The Application Site is underlain by the Middle Coal Measures, identified by the NRW as a Secondary A aquifer. Drains and a pond are noted within the Application Site boundary in the 2002 historical map edition, other surface water features are noted surrounding the Application Site including The River Twrch. The River Twrch is the nearest identifiable River to the Application Site, at its closest point approximately 125m west of the Application Site (at northern section of site), smaller issues are noted to the south of the Application Site which later join the River Twrch further west. The biological quality of the River suggests that it is of 'fairly good / good' quality status. Subsequently, the value / sensitivity of the receptor is classed as moderate; and

10.3.62 *Sensitive sites* - The SSSI site (Cwm Twrch) located approximately 140 m west of the Application Site is deemed to be a sensitive receptor. Due to its statutory designation as a SSSI, the value / sensitivity of the receptor is classed as high. However, it should be noted that the designation of SSSI for this site is based on geological importance. The potential to impact on the stratigraphy of another site located over 100 m away is very low. Potential impact on this receptor is considered to be negligible. As such, the impact on the SSSI is reviewed, but not considered in any great detail.

10.4 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

10.4.1 This section presents the findings of the assessment for the construction and operational use of the Proposed Development and identifies any significant effects.

Design Solutions & Assumptions

10.4.2 Construction best practice will be adhered to at all times during the works.

10.4.3 As part of the groundworks and assembly phase required for the construction of the solar farm, a Construction Environmental Management Plan (CEMP) will be developed and agreed with the Regulator prior to the commencement of works.

10.4.4 A Site Waste Management Plan (SWMP) and Materials Management Plan (MMP) will also be prepared and appropriate guidelines and industry best practice will be adopted and adhered to.

10.4.5 The CEMP will include (but not be limited to) information pertaining to the location and characteristics of any contaminated material, as well as appropriate working methods and site management in accordance with current best practice and identify appropriate Personal Protective Equipment (PPE).

10.4.6 Dust generation will be minimised by damping-down work areas during periods of dry weather and sheeting of stockpiles and lorries where appropriate. Wheel washes will be employed to minimise the transport of mud / dirt onto the public highways. Surface water run-off / drainage will be managed during construction works in order to avoid adverse impacts on the identified surface water receptors.

10.4.7 There will be areas used for the storage of materials, waste and containers during the construction and operational phase. Where storage / stockpiling of materials occurs, the material will stay within the Proposed Development boundary.

10.4.8 Potential for contamination from leaks and spills from vehicles / storage will be controlled by such measures as:

- The storage of fuel, oil, and chemicals within a secure bunded area or secondary containment that has no less than 110% volume capacity of any tanks / containers;
- The removal and safe disposal of leaking or empty oil drums via a licensed waste disposal contractor;
- Adequate onsite availability of oil spill clean-up equipment;
- The use of drip trays under mobile plant will be employed to prevent pollution from leaking oils or liquids;
- The preparation of incident response plans to inform contractors of required interventions in the event of a pollution incident. Spillages or leakages to be recorded on a 'Spill Record Sheet';
- Issues relating to minimising waste and thereby reducing the risk of contamination to be contained in a SWMP and MMP and agreed in writing with PCC, as well as other regulators prior to the commencement of construction.

10.4.9 An intrusive ground investigation will be conducted as part of the design and assessment. As a matter of construction quality, structures (such as substations, transformers, etc.) will be designed to be appropriate for the ground conditions present throughout their design life.

10.4.10 In considering the assessment of likely significant effects potential source of contamination presented by the Application Site's historical association with opencast mining and current agricultural land use are considered those most pertinent to the assessment.

10.4.11 In considering the assessment of likely significant effects ground hazard presented on the Application Site relating to historical shallow coal mining, opencast mining and opencast backfill processes are considered those most pertinent to the assessment

10.4.12 A set of procedures will be adopted and implemented during the construction phase. These will contain a range of environmental controls to minimise the risk of disturbance of any underlying ground contamination and to avoid contamination from construction activities such as spillages.

10.4.13 The appropriate guidance from NRW should be adhered to during construction and operation.

10.4.14 There is also a risk to construction staff handling potentially contaminated material. It is likely that exposure of construction workers to contamination will be limited due to the relatively short duration of their activities and the use of PPE.

10.4.15 During operation, it is assumed that the following mitigation measures will be maintained to prevent contamination to soils:

- All fuel, oil or chemical storage tanks will be bunded and located on areas of hardstanding;

- All waste material, including material to be processed at the Application Site will be stored appropriately; and
- All tanks, bunds, drains and hardstanding will be maintained to a good standard.

Construction

Human Health

10.4.16 The critical human health receptor in relation to likely significant effects that may occur during the construction phase is construction workers. In accordance with the assessment methodology (**Appendix 10.5**), the receptor sensitivity has been classified as 'moderate' on a sitewide basis, although it should be emphasised that this is a conservative classification designed to reflect the potential worst-case conditions in areas of the Application Site that are the most affected, rather than being indicative of the likely conditions across the Application Site.

10.4.17 The construction will potentially introduce new sources of contamination (such as fuel spillages, transformer fluid, etc.) and disturb and mobilise existing sources of contamination. Construction activities may introduce new pathways for migration of existing contamination such as excavation and exposure of contaminated soil, remobilisation of contaminants through soil disturbance and the creation of preferential pathways for surface water run-off and ground gas migration pathways. Potential changes to the baseline situation creating PCLs, which have been assessed within this chapter are:

- Potential for mobilising contaminants by excavation and stockpiling of material, increasing the risk to controlled water receptors through leaching and run-off. Earthworks could provide opportunities for run-off to contain suspended solids if not managed properly;
- Potential for exposure of human receptors by generation of potentially contaminated dust and vapours released by the construction works; and
- Potential for creation of new pathways to groundwater during groundworks, through opening up ground temporarily and construction activities, such as earthworks, installation of below-ground services and foundations.

10.4.18 While the potential exposure duration for construction workers is limited, the nature of the construction activities (direct exposure) promotes the likelihood of a source-pathway-receptor linkage. Therefore, the presence of construction workers represents an increase in receptor sensitivity from the baseline conditions, where the initial conditions relate to infrequent and transient site users as the only feasible human heath receptors.

10.4.19 The WA Phase 1 Desk Study Report[2] and CSM have identified historical land uses, such as a colliery, old brickworks, coal levels, an unspecified disused mine, and a refuse heap as potential sources of contamination. Ground gas and surrounding industrial land uses/features have also been identified as being potentially contaminative. Based on the potential sources, it is possible that limited contamination may be widespread (due to mining being undertaken across a large portion of the Application Site).

10.4.20 The human health receptor (in relation to construction) is considered to be of moderate sensitivity and the magnitude of effect is medium, giving a moderate significance of effects. The probability of encountering contamination is considered to be medium. Therefore, prior to mitigation the effect on human

health is direct, permanent **Moderate Adverse** and **Significant**. This classification relates to acute exposure to the outlined risks prior to any mitigation.

10.4.21 Mitigation measures will be incorporated into the construction process as outlined in **Section 10.5**. These will include the adoption of working methods during construction to manage appropriately groundwater impacts, implementation of appropriate pollution incident control and implementation of appropriate and safe storage of fuel, oils and equipment.

10.4.22 To assess the ground conditions more conclusively, intrusive ground investigation works will need to be undertaken. At the time of preparing this Chapter, no intrusive works have been carried out. Subsequently, any comments regarding contamination and relevant risks on the Application Site is solely based on desk-based data and the site walkover undertaken by Wardell Armstrong (as included within Wardell Armstrong Phase 1 Desk Study[2]).

10.4.23 No asbestos containing material (ACM) was visually identified during the walkover. However, in line with best practice, a standalone visual inspection, is not suitable to confirm the presence or absence of asbestos containing materials. This needs to be accompanied with microscopic screening of soil samples in an accredited laboratory.

10.4.24 Due to the nature of the site history, ACM is anticipated to be encountered at the Application Site. There is no information or evidence to suggest that remediation has taken place at the Application Site. Therefore, prior to further assessment and mitigation, the effect on human health from ACM is also considered to be direct, permanent **Moderate Adverse** and **Significant**.

Ground Gas

10.4.25 The primary ground gas source is likely to be any onsite made ground which, based on the information available regarding its likely source, may contain some organic-rich content, but is unlikely to contain large quantities of degradable material (i.e. there are no records of domestic or putrescible waste landfills at or near the Application Site). Mining backfill typically comprises rock fill and re-worked soil materials.

10.4.26 Ground gas risk is associated with backfill materials/made ground and mine gas from historical shallow mine workings.

10.4.27 Gas generated from historical shallow mine workings may have the potential to migrate upwards through fissures and backfill materials. Ground gas can concentrate within confined spaces (i.e. excavations).

10.4.28 In areas of onsite historical mining, made ground is likely to be encountered to suspected c.<60 m below existing ground level.

10.4.29 Depending on the requirement for as yet unplanned maintenance buildings or additional site structures on site, there may be a requirement to monitor and measure the potential risk of gas accumulation within the buildings to ensure risk is quantified and mitigated.

10.4.30 There is limited potential for onsite materials that may generate hydrocarbon vapours e.g. remnant fuelling infrastructure, soil contamination etc. However, effects from vapours have not been considered within the ground gas risk

classification, as these are assessed within the human health risk classification as part of potentially contaminated soils (i.e. the pathways in relation to human health risk include vapour ingress). It should be noted that there is an historical tank (of unknown content) located approximately 80m to the west of the Application Site. However, the potential risk from a tank at this distance away from site is considered to be low. Subsequently, this potential pollution source is not considered further in any considerable detail.

10.4.31 It is recommended that ground gas is assessed by means of installing ground gas monitoring wells in accordance with best practice guidance. Where possible, gas samples should also be collected from a selection of monitoring wells and analysed for bulk gas composition to validate the in-situ monitoring.

10.4.32 Humans within temporary site buildings during the construction phase and near excavations represents a potential receptor for ground gas and vapours from soil materials underlying the Application Site. However, cabins commonly used within the temporary construction compounds are generally raised above ground, thereby introducing a void between the ground and the cabin. Whilst the receptor sensitivity is assessed as moderate and the magnitude of effect (i.e. potential asphyxiation / ill health via carbon dioxide inhalation or explosion due to methane accumulation) is assessed as high, the probability of gas accumulation occurring within the cabins onsite is considered low. Therefore, there is likely to be a direct, temporary **Moderate Adverse** effect that is **Significant.**

Controlled Waters

10.4.33 Hydrogeological information has been obtained from a review of the Groundsure Report.

10.4.34 This information indicates the Application Site to be underlain by Superficial Deposits which are classified as a Secondary Undifferentiated aquifer. These are deposits which are variable in nature and thus difficult to classify.

10.4.35 The underlying solid strata are classified as a Secondary A Aquifer.

10.4.36 The highest onsite receptor sensitivity for groundwater (Secondary A Aquifer) is classified as 'moderate' on the grounds that the Secondary Aquifer is the second highest national designation prescribed by the EA/NRW.

10.4.37 The Application Site does not lie within any SPZ designations.

10.4.38 The principal surface water receptors are the drains/rises on site, drains and rises within the local area and the River Twrch approximately 125 m west of the Application Site. Due to the River's quality classification being recorded as 'fairly good/good' (within Groundsure Report) and lack of current understanding regarding hydraulic connectivity between the River and the controlled waters identified at the Application Site, the receptor sensitivity is considered medium in this instance. The river is unlikely to be directly recharged by groundwater or surface water collected on the Application Site.

10.4.39 The construction activities present the potential for additional contamination sources and pathways. Activities associated with the construction phase that may introduce new contamination sources and / or pathways are:

- Earthworks operations, including the excavation and stockpiling of materials; and

- The handling and storage of chemicals and fuel (e.g. potential for accidental spillage). This will be minimised as far as reasonably practicable by implementation of a CEMP.

10.4.40 Where possible, the leachability of contaminants should be assessed as part of future ground investigation works.

10.4.41 There are no groundwater abstractions recorded within 1 km of the Application Site. The closest abstraction point is recorded 1.7 km away from the Application Site. Furthermore, a Secondary (A) Aquifer designation is recorded at the Application Site and a potential source of contamination has been identified (especially in relation to made ground). Therefore, the potential contaminative impact on the onsite groundwater as a potable resource is considered to be low.

10.4.42 The controlled water receptor (in relation to construction) is considered to be of moderate sensitivity and the magnitude of effect is medium, giving a moderate significance of effects. Based on available information, the probability of encountering contamination is considered to be low. Therefore, prior to mitigation the effect on controlled waters is direct, permanent **Minor to Moderate Adverse** and **Significant**. This classification relates to acute exposure to the outlined risks prior to any mitigation.

Waste Soils and Soil Re-use

10.4.43 Significant volumes of excavated site won soil are not anticipated and the majority of materials are likely to be suitable for re-use on site. Excess material may be generated during the construction phase through ground re-profiling as part of the Proposed Development. While it is likely that the majority of the excess material may be suitable for re-use, there is a potential that some may contain hazardous material such as asbestos associated with any made ground / infilled materials (i.e. backfilled opencast mine workings).

10.4.44 An appropriate MMP will be prepared for the construction works to allow the re-use of suitable soils on the Application Site and to ensure excess / waste materials are minimised and managed appropriately. The design of the Proposed Development will also seek, as far as reasonably practicable, to source local materials, to reuse and recycle materials on site. Therefore, the impacts of soil reuse and waste are assessed to be **Minor Beneficial** and **Minor Adverse** respectively and are classed as **Not Significant**.

10.4.45 Therefore, the impacts on waste soils and soil re-use are considered to be temporary, short term, positive and negative, and direct and classed as **Not Significant**.

Physical Effects

10.4.46 A qualitative approach has been undertaken to assess the likely effects of the Proposed Development on topography, soil compaction, contamination, soil erosion and ground stability. The effects have then been categorised in accordance with the methodology outlined in the sections above.

10.4.47 The Proposed Development may cause physical effects associated with stripping of topsoil, vegetation clearance, earthworks to level the Application Site, temporary stockpiling of materials and construction of structures (i.e. substations). These are discussed in more detail below.

Physical Effects: Topography

10.4.48 From a review of the existing data available at the time of writing, it is considered that the proposed works are likely to have a limited effect on the topography of the Application Site. The Application Site currently lies at between 162 m above ordnance datum (AOD) in the south of the Application Site to 196 m AOD in the north of the Application Site. Due to the nature of the Proposed Development, considerable earthworks are not likely to be required during the construction phase. Subsequently, the majority of impacts associated with any proposed earthworks will be limited, temporary and will be managed through mitigation by design.

10.4.49 The effects on topography are therefore considered to be temporary, short-term and direct and adverse/negative. The value / sensitivity of the receptor is classed as **low** and the magnitude of the impact is considered to be **negligible** in accordance with **Appendix 10.5**. The overall effect is therefore considered to be **Negligible** and classed as **Not Significant**.

Physical Effects: Soil Erosion

10.4.50 There is likely to be increased temporary soil erosion from the stripping of topsoil, vegetation clearance, general earthworks, excavations (i.e. substation areas and access road) as well as temporary stockpiling and the movement of any heavy plant. There is also the potential for increased runoff during earthworks carrying a high sediment load to affect surface water receptors. However, designed mitigation will reduce potential impacts from soil erosion. Areas required for temporary works will also be reinstated.

10.4.51 The effect on soil erosion is considered to be temporary, short term and direct and adverse/negative. The value / sensitivity of the receptor is classed as **low** and the magnitude of the impact is considered to be **negligible**. The overall effect is therefore considered to be **Negligible** and classed as **Not Significant**.

Physical Effects: Ground Stability / Soil Compaction

10.4.52 The Groundsure reports and available BGS data have been reviewed to assess the ground stability hazard rating at the Application Site.

10.4.53 Based on review of the available information, it is indicated that there is a very low hazard rating of shrink-swell clays for the entire Application Site. There is a negligible hazard rating for ground dissolution of soluble rocks across the Application Site.

10.4.54 There is also a very low hazard rating in relation to compressible deposits for the vast majority of the Application Site, increasing in hazard rating to very low for the extreme northwest boundary of the Application Site – this is associated with recorded workings in that location.

10.4.55 Further review indicates that there is a very low hazard rating in relation to collapsible deposits on the Application Site. There is a negligible hazard rating of running sand for the majority of the Application Site increasing to a low hazard rating for a large portion of the western section of the Application Site. There is generally a very low hazard rating of landslides at the Application Site with the hazard rating increasing to low and moderate in the northern extremities of the Application Site with no records of landslip within 500m of the Application Site boundary.

10.4.56 The Application Site is identified as having a low UXO risk, whereby Zetica Ltd recommends no further action is required.

10.4.57 CMRA information identifies shafts within the site footprint and between the north and southern parcels. Records show that 5no. shafts have been removed to depth (i.e. removed to the base of the shaft at the anthracite Peacock Seam). Four adits were removed to depth where they intersect the opencast area. It is likely that parts of the some of the adits remain present below ground (within the opencast areas).

10.4.58 It is anticipated that further assessment of the ground conditions and designed mitigation/remedial measures will be undertaken as part of the detailed design to reduce any potential effects of ground instability, compaction and settlement where necessary. If and where required, the Proposed Development will incorporate ground stabilisation/improvement, which will reduce ground hazards and permanently improve ground stability and compaction.

10.4.59 Therefore, the effect on ground stability and ground compaction is considered to be permanent, long term, beneficial/positive and indirect. The value / sensitivity of the receptor is classed as **low** and the magnitude of the impact is considered to be **negligible**. The overall significance of effect is therefore considered to be **Negligible** and classed as **Not Significant**.

Physical Effects: Sensitive Sites – SSSI

10.4.60 Due to the basis of the Cwm Twrch SSSI statutory designation, the receptor sensitivity is considered to be high. This is based on the fact that the designation is of national importance. The probability of the development impacting on the SSSI located 140m north of the Application Site is deemed to be low. Any potential impact on the SSSI originating from the Proposed Development would most likely be related to contamination (groundwater, air dispersal, etc.). However, due to the distance from the Application Site, the probability of encountering contamination originating from the Proposed Development is considered to be low.

10.4.61 It is anticipated that further assessment of the ground conditions and designed mitigation/remedial measures will be undertaken as part of the detailed design to reduce any potential effects impacting the geology at the SSSI where necessary. In the unlikely event that remedial measures are required, the Proposed Development will incorporate necessary enhancement measures, which will reduce ground hazards that might impact on the SSSI key characteristic regarding geology.

10.4.62 The effect on the Cwm Twrch SSSI is considered to be permanent, long term and direct and adverse/negative. The value / sensitivity of the receptor is classed as **high** and the magnitude of the impact is considered to be **negligible**. The overall effect is therefore considered to be **Negligible** and classed as **Not Significant**.

10.4.63 The SSSI was considered as part of the impact assessment due to its inherent sensitivity. However, the above review clarifies that the SSSI does not need to be considered further within this Chapter. Subsequently, the Cwm Twrch SSSI is not assessed in any further detail.

Operation

10.4.64 The operational phase impact assessment has been undertaken by comparing the land contamination risks at the baseline stage to those predicted during operation of the Proposed Development.

Human Health

10.4.65 As identified in within this Chapter, a number of potential contamination sources exist within the Application Site's boundary. As part of any prudent construction phase, the contamination pathway links would be mitigated (i.e. remediation processes including removal, capping, etc.). The operational phase human health receptor is likely to be low. This is due to the very limited risk of exposure to contamination in relation to the periodic visits by solar farm maintenance staff.

Contaminants Associated with Substations & Transformers

10.4.66 One of the key components in high voltage transmission and distribution systems are power transformers.

10.4.67 Liquid dielectrics are used as insulation and cooling agent in almost all the high voltage power transformers. This petroleum based dielectric liquid is called "transformer oil". One of the major disadvantages is the transformer oil can be easily contaminated. During packaging, shifting, storing the transformer oil can be contaminated. During the operation it contacts with metal, iron core and pressboard insulation inside a transformer. Contaminants such as metal filings or cellulosic residual can also be formed in the oil, especially for transformers with aged paper insulation.

10.4.68 Polychlorinated biphenyls (PCBs) are mixtures of synthetic organic compounds, non-flammable, highly electrically resistant, with good insulation properties and very stable at high temperatures and pressures. Therefore, they were at first used as dielectric fluids and insulators in transformers and capacitors. In addition to their use for the prevention of fire and explosion, they were used in hydraulic fluids, wax casting, production of carbonless copy paper, compressors, heat transfer systems, plasticizers, paints, adhesives, pesticides, etc. However, beside the good qualities they have, PCBs are highly toxic and carcinogenic substances that get into the human body usually through the skin or digestive tract.

10.4.69 Risk of soil contamination is associated with the possible spillage or leakage of transformer oil. The possibilities of contaminating the soil during incident of oil spillage or leakage are not high although the amount of the transformers oils could be accidentally released to the environment is very high (a large amount stored in every transformer), and, eventually, leakage of transformers oil is considered as being a great and serious environmental accident.

10.4.70 Due to current designs of substations and transformers, leakage of transformer oil is unlikely. However, leakage may occur during maintenance or in rare cases of leakage due to poor integrity of the transformer structure. Based on this, and the limited presence of occupants during the operational phase, the potential for contamination impact is considered low.

10.4.71 The operation will potentially introduce new sources of contamination. Below ground services (i.e. services connected to the switchgear substations, transformer, CCTV, security fences, etc.) could create additional potential

pathways for the migration of potential contamination that were not present at baseline and construction stages. However, the Proposed Development will be operated in accordance with the relevant regulations, best practice guidance and pollution prevention.

10.4.72 Post mitigation, the contamination source-pathway-receptor linkage would not be anticipated as being complete.

Ground Gas

10.4.73 The receptor in relation to ground gas is human health, the sensitivity of which has been defined as 'moderate'. The potential for the presence of ground gas, landfill gas or volatile vapours from soil or groundwater sources to pose an increased risk post mitigation is limited during the operation phase. No significant/residential buildings are proposed as part of the Proposed Development and, as such, no associated confined spaces where ground gas could accumulate within a dwelling (long-term exposure) will be present post-construction. Cabins commonly used within the temporary construction compounds are generally raised above ground, thereby introducing a void between the ground and the cabin. Appropriate information will be provided within the Health and Safety file developed under the Construction Design Management (CDM) Regulations and appropriate remediation/mitigation measures will be undertaken where necessary.

10.4.74 As such the ground gas effect is not considered to be significant. Post mitigation, the source-pathway-receptor linkage would not be anticipated as being complete.

Controlled Waters

10.4.75 Receptor sensitivity for controlled waters (i.e. secondary aquifer and drainage network on site) is 'moderate'. In relation to the site-derived potential sources of contamination (i.e. based on previous mining land use and current agricultural status at the Application Site), it is considered that current site conditions may liberate the potential pathways across most of the Application Site. This is due to the local hydrogeological setting, which indicates limited natural superficial deposits overlying the aquifers at the Application Site. Site activities during the operational phase may represent a risk of mobilising any existing groundwater contamination at depth.

10.4.76 Surface water run-off and throughflow through the near surface soils pose limited risk to River Twrch located approximately 125 m west of the Application Site. Based on limited contamination sources likely to be present during the operation phase, the magnitude of effect is deemed to be low. This would result in a risk significance level of minor to minor which is further substantiated due to scarce superficial cover at the Application Site indicating limited attenuation potential. Post-mitigation, any contamination-pathway-receptor linkage would not be anticipated as being complete.

10.4.77 Therefore, the risks identified to human, controlled waters and property receptors during operation are assessed as very low. Compared to the existing baseline, the level of risk to receptors has remained generally the same. An overall **Negligible to Minor Beneficial Effect** has been predicted which is **Not Significant**.

Waste Soils and Soil Reuse

10.4.78 The potential for generation of waste soils and opportunity for re-use mainly relates to the construction phase as land take and disturbance of land will occur as part of the construction work. Therefore, impacts during the operational phase is classed as **Negligible** and **Not Significant**.

Physical Effects

10.4.79 Subsidence information provided by the BGS indicates that the highest compressible ground hazard rating is classified as very low due to the limited potential for compressible deposits at the Application Site.

10.4.80 The highest hazard rating relating to natural ground subsidence at the Application Site is associated with potential landslides. A hazard rating of low and moderate are recorded in the northern extremities of the Application Site. There are no specific records of onsite landslip or records of landslip occurring within 500m of the Application Site boundary.

10.4.81 Impacts in relation to physical effects are considered to be mainly related to the construction phase of the Proposed Development. However, certain physical effects can take place during the operational phase such as freeze-thaw processes impacting on soils, subsidence, landslides, etc. It is assumed that designed mitigation (Section 10.5) will be undertaken and will improve the condition of the Application Site for the Proposed Development. During operation, the design for the Application Site will have been agreed, the topography will be confirmed and there will be limited soil erosion and soil compaction anticipated due to the ground coverage and end use.

10.4.82 Therefore, the effect of the Development on topography, soil erosion, ground stability and compaction are considered to be temporary/permanent, short/long term, positive and direct and assessed as **Negligible** and **Not Significant**.

Decommissioning

10.4.83 A decommissioning plan will be produced which will cover the mitigation that may be required in relation to ground conditions during decommissioning. The method of decommissioning of the Proposed Development will be agreed with the Local Authorities and relevant regulatory bodies prior to decommissioning. Similar precautionary measures to those proposed for the construction phase will be implemented as necessary, in accordance with good practice at that time.

10.4.84 Whilst the nature of the Proposed Development means that ground disturbance is likely to be minimal in its decommissioning, the nature of almost any construction activity on an agricultural site associated with historical mining means that the predominant concern would be in relation to silty run-off being produced. Any such run-off could then enter the existing on-site drainage network and eventually surface water (i.e. discharge points). The decommissioning of the transformers will also have an intrinsic risk associated with transformer oils and PCBs. Pre-mitigation, this potential risk would likely impact most on human health and/or controlled waters.

10.4.85 As such, the effect of the decommissioning of the Proposed Development (on surface water quality) is considered to be of low magnitude in relation to the

moderate receptor sensitivity for surface water. The probability this effect occurring is deemed to be medium.

10.4.86 Therefore, the risks identified to human, controlled waters and property receptors during decommission are assessed as low. An overall **Minor to Moderate Adverse Effect** has been predicted which is **Not Significant**. There are elements of beneficial effect to be considered also. This is in relation with the enhancements likely to be observed in relation to soil re-use and removing the potentially contaminative development – eliminating elements of potential risk associated with the Proposed Development itself.

10.5 MITIGATION AND ENHANCEMENT

10.5.1 As outlined above, the following mitigation measures will be incorporated into the design, construction and operation of the Proposed Development to reduce impacts of physical effects, and effects associated with land contamination, soil waste and soil re-use.

Mitigation by Design

10.5.2 The following section provides a summary of the design mitigation assumed to be adopted during detailed design, construction and operation stages to reduce the effects on ground conditions and contamination from the Proposed Development.

10.5.3 It is assumed that mitigation measures associated with the legal requirements or standard practices will be conditioned as part of any planning permission. These standard measures will include but not be limited to:

- Suitable levels of Ground Investigation, ground gas and groundwater level monitoring, groundwater and surface water sampling, and if necessary, Contaminated Land Risk Assessment to confirm risks from the historical land use of the Application Site and surroundings. The assessment will include appropriate remediation (if necessary) and enable materials management strategy to be developed;
- All work and submissions carried out in relation to review of ground conditions must be conducted in accordance with DEFRA and the Environment Agency's 'Model Procedures for the Management of Land Contamination, CLR 11[9]' and the Welsh Local Government Association (WLGA) document 'Development of Land Affected by Contamination: A Guide for Developers' (2012).
- Design of and completion of any remedial works considered necessary following the investigation and assessment in accordance with regulatory standards and current best practice including but not limited to CLR11[9] and BS10175[10];
- Design to include quarantine area for any contaminated wastes;
- Design of earthworks to allow retention of as much material as possible on-site, and the long-term storage and management of materials on-site to be minimised;
- Design of structures and selection of construction materials in accordance with British Standards and best practice guidance at the time of the design. The design will be required to consider the ground

[9] Defra and Environment Agency, 2004. Model Procedures for the Management of Land Contamination, Contaminated Land Report 11.

[10] British Standards Institute, 2017. Investigation of potentially contaminated sites, code of practise; BS 10175:2017.

conditions including the potential for movement, the geological fault, ground gas and ground aggressivity; and

- Drainage strategy / SuDS design / flood prevention measures considering the ground conditions and level of contamination present onsite.

Construction Phase

10.5.4 Appropriate mitigation measures are recommended to avoid, reduce, or remedy likely significant adverse effects upon the environmental baseline.

10.5.5 Where practicable, likely significant adverse effects identified in the previous sections need to be accounted for in terms of a mitigation strategy and through the measures incorporated within the Proposed Development.

10.5.6 Mitigation measures will comprise further ground investigation to characterise the Application Site and potential sources, pathways, and receptors for contaminants present (potentially including remediation). Validation works will also be required for the Application Site as part of the construction process and to discharge any associated planning conditions via submission of relevant reports to the planning authorities.

10.5.7 Piling is not anticipated as part of the works. However, if piling is required and if there is confirmed evidence of ground contamination on the Application Site, piling risk assessment in accordance with the Environment Agency guidance document Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination will be undertaken. Piling techniques deemed appropriate to identify and manage potential risks as a result of creating pathways for unknown contamination to groundwater will be implemented.

10.5.8 Once this has been achieved, any specific detailed design proposals for development would address the existing ground conditions in light of specific layout details. Supplementary ground investigations would be carried out to provide detail on specific issues. This applies to the entire Proposed Development footprint.

Human Health

10.5.9 It is considered that the potential effects associated with contamination within the soil will be mitigated during the construction phase via the implementation of a suitable Remediation Strategy and subsequent validation process.

10.5.10 The Remediation Strategy will be adhered to where required and, therefore, no additional mitigation measures are deemed necessary.

10.5.11 While the desk-based assessment is considered appropriate to characterise the existing baseline conditions in order to identify and assess the likely significant effects, a ground investigation is required.

10.5.12 The ground investigation should be undertaken, prior to works commencing, to characterise the Application Site, potential sources, pathways, and receptors. Furthermore, the ground investigation will identify appropriate remediation and validation works as part of the pre-construction process.

10.5.13 It is not anticipated that results of the ground investigation would materially affect the assessment reported in this Chapter, although, in the worst case, clean cover of made ground or removal of contaminated materials may be

necessary. Should unexpected contamination be identified during the course of construction, then general principles for dealing with unexpected contamination will be as follows:

- Identification of any suspicious materials by site management;
- Isolation of affected area and assessment by a suitably qualified environmental professional, including the laboratory analysis of soil and / or water samples;
- Determination of the level of risk and identification of an appropriate mitigation strategy, to be approved by the Regulator. Mitigation measures developed in accordance with the 'waste hierarchy', with treatment and retention of material onsite favoured over offsite disposal;
- Review and update the CEMP to account for the material encountered; and
- Validation of any remediation work, to confirm that the unexpected contamination has been adequately mitigated, and validation data reported to the Local Authority.

10.5.14 Appropriate surveys and/or assessments will be required in relation to these (and other) contaminant sources in advance of any construction work to ensure adequate protection of construction workers, any users of adjacent land and the wider environment. This should include consideration of the effects of any dust mobilisation on adjacent sites and nearby surface waters, which it is anticipated would be managed by standard environmental good practice.

10.5.15 With the design mitigation, risks identified to human health during construction are assessed as **very low to low**. Compared to the existing baseline, the level of risk to receptors has been reduced due to the design mitigation for the prevention of impacts from land contamination.

10.5.16 The impacts from land contamination are therefore considered to be permanent, long term and direct. An overall **Negligible** significance of effect has been predicted, which is classed as **Not Significant**

Ground Gas

10.5.17 Should significant gas sources be identified, mitigation measures for the construction phase may include selected localised removal of gas sources and appropriate confined working procedures (i.e. while working in trenches and / or enclosed spaces). Whilst buildings of traditional construction are not anticipated on site, the assessment and interpretation of measurement data would identify whether a risk exists from ground gases or vapours. This can be through the use of simple calculations or bespoke statistical models.

10.5.18 Mitigation is most often provided by the use of ventilation and membranes in construction design, which provide primary and secondary forms of protection for buildings from the ingress of gases and vapours. Ventilation can be via passive air flow or active pumping. In all cases validation of construction and installation techniques is important.

10.5.19 In some cases where the risks posed by gases and vapours are due to them being a by-product of more significant soil or groundwater contamination, mitigation can be provided by the remediation of the specific contamination sources.

10.5.20 With the relevant mitigation incorporated, risks identified to human health during construction are assessed as **very low to low**. Compared to the existing baseline, the level of risk to receptors has been reduced due to the design mitigation for the prevention of impacts from ground gas risk. An overall **Negligible** significance of effect has been predicted, which is classed as **Not Significant.**

Controlled Waters

10.5.21 The leaching of potential contamination from near surface soils presents a pathway for the transmission of contamination to the underlying aquifers. Contamination may also reach surface water bodies (i.e. although the nearest identifiable river, the River Twrch, is approximately 125m west of the Application Site, there may be some unrecorded surface water features closer to site) via overland flow and / or through flow / shallow groundwater flow. There is also the potential that historical contaminant inputs to the aquifers may be mobilised as a result of the Proposed Development.

10.5.22 Mitigation would involve a ground investigation, including a groundwater risk assessment and leachability testing of identified contaminants. Should the ground investigation identify potential significant risk, then specific mitigation measures will be determined, based upon the nature and severity of the contamination. Specific mitigation will need be confirmed but will likely include the removal of any contamination hotspots (contingent on the results of leachability testing).

10.5.23 In order to better quantify the risk posed by contaminative sources, a surface water and groundwater monitoring regime should be implemented prior to and during construction. Should these investigations find contamination, appropriate mitigation measures must be used in accordance with contaminated land guidance.

10.5.24 With the design mitigation incorporated, risks identified to controlled waters during construction are assessed as **very low to low**. Compared to the existing baseline, the level of risk to receptors has been reduced due to the design mitigation for the prevention of impacts from land contamination.

10.5.25 The impacts from land contamination are therefore considered to be permanent, long term and direct. An overall **Negligible** significance of effect has been predicted, which is classed as **Not Significant**

Ground Stability

10.5.26 Whilst the likelihood of an event occurring at the Application Site as a result of ground instability is low, any necessary mitigation will be dependent upon the outcome of the ground investigation. Should mitigation be required, it will likely involve identifying the areas associated with highest risk within the CEMP and remaining diligent onsite (i.e. reporting cracks within the ground etc.). Should significant instability features be identified, appropriate earthworks or engineering solutions will be developed (as appropriate) in these areas.

10.5.27 Stabilisation works may be required with regards to the mine shafts, adits, and/or shallow mine workings at the Application Site. The requirement for stabilisation works would be assessed during future ground investigation works and consultation with the Coal Authority.

10.5.28 With the design mitigation incorporated, risks identified to ground stability during construction are assessed as **very low**. Compared to the existing baseline, the level of risk to receptors has remained generally the same due to the design mitigation for the prevention of impacts from ground instability.

10.5.29 The impacts from mitigation on land instability are therefore considered to be permanent, long term and direct. An overall **Negligible** significance of effect has been predicted, which is classed as **Not Significant**

Operational Phase

10.5.30 It is assumed for the purposes of this assessment that those mitigation measures identified for the construction phase will be undertaken and will improve the condition of the Proposed Development (for contamination and physical effects) and will mitigate the risks during operation. Operational phase mitigation would include regular maintenance and monitoring processes. This will especially be the case in relation to potential contaminative sources (such as transformer oils, PCBs, fuel, etc.) Therefore, no further mitigation is required at the operational phase.

Additional Mitigation

10.5.31 It is assumed that the above designed mitigation will be adopted accordingly as part of the design and construction of the Proposed Development and the development will be operated in accordance with the relevant regulations, best practice guidance and pollution prevention. However, the following additional mitigation over the legal requirements which may be incorporated into the construction phase are listed below.

- Health and safety risk assessments, method statements and appropriate Personal Protective Equipment (PPE) for the protection of construction workers will be implemented in accordance with the Control of Substances Hazardous to Health Regulations;
- Environmental awareness training will be provided and documented to all staff working on the Project, including daily site briefings (Toolbox Talks);
- Hand washing facilities should be made available to site operatives, site rules will be created insisting on hand washing prior to breaks and at the end of the working day, and eating and drinking will be limited to site welfare facilities during agreed break periods;
- Limiting the area of earthworks at any one time to reduce temporary effects on topography, soil compaction and erosion;
- Limiting the duration of soil exposure and timely reinstatement of vegetation or hardstanding to prevent soil erosion;
- Silt management to limit runoff of exposed soil into surface waters which would include bunds, drainage covers and silt traps;
- Hydro-seeding or covering of surcharged areas / stockpiles where necessary to reduce soil erosion;
- Implementation of appropriate dust suppression measures to prevent migration of contaminated dust and asbestos fibres;
- Working methods during construction will be implemented to appropriately manage groundwater and surface water and ensure that there is no run-off from the works, any material / waste stockpiles, and storage containers into adjacent surface watercourses;

- Efforts should be made to source local material, or reuse of material within the wider scheme;
- Consideration should be given to the design to maximise off-site construction which will reduce both materials used and waste generated onsite;
- Designated areas will be utilised for the refuelling of plant, equipment and site vehicles on hardstanding with interceptor drainage, bunds or similar;
- Implementation of appropriate pollution incident control e.g. plant drip trays and spill kits;
- Implementation of appropriate and safe storage of fuel, oils and equipmentduring construction;
- Implementation of an appropriate MMP and verification report in accordance with the CL:AIRE Code of Practice current at the time of the works.; and
- Where required after design of any relevant remediation works, the appointment of a suitably qualified contractor to safely remove and dispose of any hazardous materials such as asbestos.

Human Health

10.5.32 In addition to the surveys and assessments, good practice should be adhered to when outlining the construction process. The identified potential contamination is deemed to relate to standard earthworks and construction 'abnormals' that are common across many development sites (e.g. risks of contamination associated with historical fuel storage activities).

10.5.33 This identified contamination would be expected to be addressed during the course of the usual planning approval process for the redevelopment of a site, during which there will be a requirement for intrusive investigation and detailed risk assessment, to determine remediation requirements.

10.5.34 The findings of the intrusive investigation will identify the contaminative risk on site and subsequently ensure that suitable mitigation measures are in place. Reporting on the interpretation of chemical and geotechnical analysis/testing carried out on soil samples as part of any future investigation will outline the necessary mitigation measures.

- Ground Gas

10.5.35 On a brownfield site, if the source of ground gas cannot be removed or has not been identified, there are options for integrating mitigation measures into newly built buildings or into cover systems in the ground.

- Controlled Waters

10.5.36 Best Management Practices (BMPs) and engineering design to limit soil erosion and mobilisation/transport of sediments from disturbed areas.

- Ground Stability

10.5.37 There may be a requirement for ground improvement techniques, usually involving the removal of poor material and its replacement with suitable inert and stable material. For development on land previously affected by mining activity, this may mean prior extraction of any remaining mineral resource.

10.5.38 **Table 10.3** provides a summary of the mitigation measures outlined within this Chapter. Information on how the mitigation measures will be secured as part of the Proposed Development are also included.

Table 10.3: Mitigation Measures

Ref	Measure to avoid, reduce or manage any adverse effects and/or to deliver beneficial effects	How measure would be secured		
		By Design	By S.106	By Condition
1	Suitable level of investigation to ensure that the risks of ground contamination is adequately assessed	X		X
2	Best Practice measures included in Construction and Environmental Management Plan	X		X
3	Remediation Strategy & Remediation Works (i.e. hotspot removal, capping systems, etc.) – where required	X		X
4	Validation Works - where required			X
5	Monitoring of ground gas, groundwater and surface water			X
6	Localised removal of detrimental gas sources or passive gas protection measures incorporated into buildings/structures – where required	X		X
7	Appropriate Design Proposals (relevant structures and design strategy i.e. drainage)	X		X
8	Appropriate Design or Engineering Solutions in relation to any ground stability issues	X		
9	Suitable Construction Environmental Management Plan (CEMP)			X
10	Adoption of Best Management Practices during all phases of works including correct storage of fuel, oil and/or chemicals on site.	X		
11	Incident Response Plans (mitigating against spills, leakages, etc.)	X		
12	Liaison with Regulator	X		X

Enhancements

10.5.39 In relation to ground conditions and contamination, enhancement measures considered to be 'construction best practice' should be adopted. The Construction and Environmental Management Plan (CEMP) for the Development will set out the measures to be implemented during construction. In relation to ground conditions and contamination, these measures are likely to include but not be limited to:

- A procedure will be included within the CEMP to manage previously-unidentified contaminated material that is encountered during the works;
- Storage areas for materials will be identified, and surplus soil arisings from levelling or excavation works appropriately especially where there is some evidence of contamination prior to its removal or treatment; and

- Where possible, recycled and secondary aggregates should be specified in the design, thereby reducing the demand for virgin material.
- The following considerations have been outlined as enhancements in relation to ground conditions at the Application Site:
- Preparation of a Surface Water Management Plan;
- Preparation of a Soil Management Plan;
- Water quality should be tested upstream and downstream of any construction works so that the impact of the works can be determined. The programme of water testing should be included within the CEMP;
- Potential for turbid runoff to enter watercourses should be controlled and limited through measures set out in the CEMP;
- Concrete should be brought to the Application Site ready mixed;
- All vehicle washouts will preferably take place off-site. Any drainage or water used for on-site washing should be collected and directed to a sump located in a suitably lined and contained area for treatment prior to discharge;
- Rainfall runoff from the substation will be managed through discharge to infiltration drains or other SUDS techniques, appropriate for the scale of the substation development;
- Storage of oils and other potentially polluting substances will be within the construction compound. Storage will be within impervious storage bunds with 110 % capacity, so that any spillages or leaks are contained;
- Construction machinery will be checked regularly and any maintenance to machinery would occur over hard standing within the construction compound or on an alternative suitable impermeable ground cover;
- Drip trays will be mandatory beneath all stationary construction vehicles and spill kits comprising absorbent mats or absorbent sands will be available on-site at all times;
- All relevant staff will be trained in the use of spill kits; and
- The electrical substation and control buildings will be subject to routine checks and maintenance.

10.6 CUMULATIVE AND IN-COMBINATION EFFECTS

10.6.1 This section of the Chapter responds to the requirement in the Regulations to assess the cumulative effects of the Proposed Development. For the cumulative assessment, two types of effect are considered:

- The combined effect of individual effects, for example contamination or ground instability on a single receptor; and
- The combined effects of development schemes which may, on an individual basis be insignificant but, cumulatively, have significant effect. This is conducted principally with reference to committed development in the surrounding area. The cumulative assessment includes the approved 20 MW solar installation (*Planning Reference P/2015/0176*) to the east of the Application Site.

10.6.2 Potential cumulative impacts may occur from interaction with other proposed (committed) developments located near the Proposed Development.

10.6.3 Cumulative effects have been considered both in terms of the cumulative effects of the various elements of the Proposed Development (intra-project cumulative effects) and the accumulated effects of the Proposed Development with 'other developments' proposed in the local area.

Intra-Cumulative Effects

10.6.4 The relationship and interactions between ground conditions and contamination and other environmental elements (e.g. water quality) are incorporated into the assessment above. Due to the application of embedded and additional mitigation measures (i.e. CEMP, SWMP and MMP) within the project design (i.e. site investigation and remediation), there are unlikely to be any significant intra-project effects during construction, operation or decommissioning. The relevant mitigation measures ensure that significant effects on shared receptors are unlikely, or the absence of any effects on shared receptors.

10.6.5 Ground conditions and land contamination hold the potential to have an adverse effect on sensitive receptors in other environmental topics, resulting in cumulative effects. Examples may include effects on air quality, ecological receptors (i.e. biodiversity), landscape, as well as hydrology, flood risk and drainage. However, no specific effects have been identified to date.

Inter-Cumulative Effects

10.6.6 Inter-cumulative effects are the effect of more than one development upon a single environmental factor.

10.6.7 Local planning applications in the vicinity of the Proposed Development are recorded as:

- 20MW solar installation at Bryn Henllys (*Planning Reference P/2015/0176*);
- Demolition of existing derelict farmhouse and replacing it with a new farmhouse on the existing footprint (*Planning Reference P/2013/0003*);
- Erection of extension to existing agricultural building at Waunlwyd Farm (*Planning Reference P/2009/1141*); and
- Erection of an agricultural storage and implement shed at Waunlwyd Farm (*Planning Reference P/2009/1137*).

10.6.8 Based on a review of local planning applications relative to potential cumulative effects on ground conditions (1km search area from site), 1no. development is to be considered in the assessment of inter-project cumulative effects:

- The approved 20MW solar installation (*Planning Reference P/2015/0176*) to the east of the Application Site.

10.6.9 The supporting documents for the planning applications in relation to the 20MW solar installation approximately 38 m to the east of the Application Site have been reviewed in relation to the cumulative effects to geology, hydrogeology, and the ground environment between the Application Site and this consented development.

10.6.10 Cumulative impacts in this instance are considered plausible only where the development footprint of both developments overlap or there is active interaction (i.e. delivery of materials from one site to the other).

10.6.11 The approved Bryn Henllys solar farm is located immediate east of the southern parcel of the Application Site, with access to the Application Site proposed through Bryn Henllys solar farm.

10.6.12 The Bryn Henllys solar farm takes access from the existing access off Palleg Road. This existing access was used for the previous open cast minerals

extraction which ceased in 2003, as such, the access is of a standard and scale to accommodate regular HGV traffic.

10.6.13 The same construction access will be used for the Proposed Development as intended for the approved Bryn Henllys solar farm, with materials transferred within Bryn Henllys and the site. The construction of the Proposed Development would be undertaken at the same time as Bryn Henllys solar farm, resulting in an extension to the previous 30-week construction period to circa 45 weeks.

10.6.14 It should be noted that due to the close proximity of the consented Bryn Henllys solar farm development to the east, cumulative impact on human health should be considered. There is potential for interaction between the two sites.

10.6.15 Subsequently, inter-cumulative effects are possible as a result of the Proposed Development and the other committed development.

10.6.16 The risks to human health are considered on a site-specific basis. At this stage of assessment, no common human health receptors have been definitively identified as 'connected' between the Application Site and the committed development to the east. Therefore, the human health effects (with regards to contamination and ground stability) are not considered to be cumulative.

10.6.17 It is anticipated that similar planning conditions to those outlined within the decision notice for the consented Bryn Henllys solar farm (Application P/2015/0176) will be applied to the Application Site (specifically relating to ground conditions). Examples of this are included below:

"An investigation and risk assessment, in addition to any assessment provided with the planning application, must be completed in accordance with a scheme to assess the nature and extent of any contamination on the site, whether or not it originates on the site…";

"The investigation and risk assessment must be undertaken by competent persons (a contaminated land specialist with proven experience within the contaminated land industry) and a written report of the findings must be produced. The written report is subject to the approval in writing of the Local Planning Authority…";

"A detailed remediation/treatment scheme to bring the site to a condition suitable for the intended use by removing unacceptable risks to human health, buildings and other property and the natural and historical environment must be prepared and is subject to the approval in writing of the Local Planning Authority…";

"In the event that contamination is found at any time when carrying out the approved development that was not previously identified it must be reported in writing immediately to the Local Planning Authority…"; and

"A monitoring and maintenance scheme to include monitoring the long-term effectiveness of the proposed remediation is to

be agreed in writing with the Local Planning Authority and the provision of reports on the same must be prepared…".

10.6.18 Due to limited data on the groundwater/ground gas flow and direction within the Application Site and the surrounding area which includes the development to the east, there is potential for cumulative effects of chemical contamination and ground gas risk to occur to controlled waters and the ground conditions of the Application Site in general. The risk of chemical contamination and ground risk at the other site is under the Applicant's control and it is assumed that the committed development will adhere to the same mitigation measures as required and enforced by planning conditions and legal agreements, which will considerably minimise risk. In addition, provided that ground investigation, risk assessment and, if necessary, remediation/mitigation measures are implemented at the consented development site, it is considered that any cumulative effect is likely to be negligible in terms of effects on the quality of the ground conditions (soils and controlled waters) in the wider area.

10.6.19 Subsequently, it is anticipated that the inter-cumulative effect will be **Negligible** and **Not Significant**.

10.7 SUMMARY

Introduction

10.7.1 This Chapter has presented the approach and findings of the assessment of potential effects on ground conditions and sensitive receptors (i.e. human health, controlled waters, and the environment) during construction, operation and decommissioning of the Proposed Development. The assessment includes consideration of potential effects relating to topography, ground stability, contaminated land, soil compaction and soil erosion, re-use of soils, waste soils and potential polluting pathways. Where necessary, relevant mitigation and remedial measures are proposed in accordance with relevant legislation, policy and guidance.

Baseline Conditions

10.7.2 The history of the site and the surrounding land was investigated via a desk-based assessment. Published data sources were used to establish the geological conditions beneath the Application Site, identify areas of potentially contaminated land and potential land instability. The review also identified potential pollutant linkages and facilitated a risk assessment for each of the identified pollutant linkages.

10.7.3 The Application Site comprises approximately 25.6 hectares of generally restored opencast mining and currently used as agricultural land. Historical mapping has indicated the majority of the southern portion of the Application Site and the eastern half of the northern parcel of the Application Site were subject to opencast coal mining.

10.7.4 Made ground associated with opencast works is anticipated across the site. Made ground is likely to consist of opencast backfill composed of rockfill and unsaleable Coal Measures mudstone, siltstone and occasional sandstone.

10.7.5 A preliminary risk assessment concluded that there was a potential moderate to low risk to human health and controlled water receptors, mostly associated with off-site historical land uses and the potential presence of unknown filled (Made Ground) areas on the Application Site.

Assessment of Likely Significant Effects

10.7.6 With the design mitigation, risks identified to human health and controlled waters are assessed as **very low to low**. Compared to the existing baseline, the level of risk to receptors has been reduced due to the design mitigation for the prevention of impacts from land contamination.

10.7.7 The post-mitigation impacts from land contamination are therefore considered to be permanent, long term and direct. An overall **Adverse Negligible** significance of effect has been predicted, which is classed as **Not Significant**

10.7.8 With the design mitigation incorporated, risks identified to ground stability at the site are assessed as **very low**. Compared to the existing baseline, the level of risk to receptors has remained generally the same due to the design mitigation for the prevention of impacts from ground instability.

10.7.9 The post-mitigation impacts on land instability are therefore considered to be permanent, long term and direct. An overall **Adverse Negligible** significance of effect has been predicted, which is classed as **Not Significant**

Mitigation and Enhancement

10.7.10 Mitigation measures will be incorporated into the design, construction and operation of the Proposed Development to reduce impacts of physical effects, and effects associated with land contamination, soil waste and soil re-use.

10.7.11 If proper control measures are being followed during the construction and operation phases of the Proposed Development, the potential onsite impacts are expected to be of 'negligible to low' effect and not significant.

10.7.12 Designed mitigation generally will be in accordance with the relevant legislation, regulations, best practice guidance and pollution prevention methods.

Cumulative and In-combination Effects

10.7.13 If the effects of the Proposed Development and the adjacent solar installation to the east are considered together, the cumulative effect of developments of ground conditions and contamination is considered 'Negligible' and Not Significant assuming appropriate mitigation measures are implemented.

Conclusion

10.7.14 This Chapter has provided an assessment of existing ground conditions and likely significant effects associated with the construction, operation and decommissioning phases of the Proposed Development (in relation to both internal and external receptors).

10.7.15 On completion of recommended ground investigation works and subsequent assessment of the potential contamination sources, the potential construction and operational impacts will be further assessed, and appropriate mitigation developed to minimise the potential impacts. However, in view of the information currently available and following the implementation of the mitigation measures outlined within this Chapter, it is considered that residual significant effects upon geology and land quality will be Negligible.

10.7.16 Detailed ground investigations will be required in order to provide foundation recommendations at the Site and discharge relevant planning conditions, should planning permission be granted.

10.7.17 At this stage of review, it is considered that there are no insurmountable environmental, engineering, or geotechnical constraints associated with the Proposed Development.

10.7.18 Therefore, the Proposed Development at the Application Site is considered to be acceptable and there would be no adverse significant effects.

10.7.19 A summary of the significance of overall effects is provided in Table 10.4 overleaf.

Table 10.4: Summary of Effects, Mitigation and Residual Effects

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
Construction								
Land Contamination: *human health, controlled water and property receptors*	**Contamination from on-site sources**	• *Negative* • *Permanent* • *Long Term* • *Direct*	Moderate (controlled water), Low (properties), and Moderate (human health)	Medium	Local	Moderate Adverse (Significant)	A procedure will be included within the CEMP to manage previously unidentified contaminated material that is encountered during the works. Where required after design of any relevant remediation works, the appointment of a suitably qualified contractor to safely remove and dispose of any hazardous materials such as asbestos. Reduction in the need to store materials and equipment on Application Site	Negligible (Not Significant)

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
							for long periods of time. Silt management to limit runoff of exposed soil into surface waters which would include bunds, drainage covers and silt traps. Environmental awareness training will be provided and documented to all staff working on the Project, including daily site briefings (Toolbox Talks).	
Waste Soils and Soil Re- use: *soils*	**Generation of waste soils**	• *Temporary* • *Short Term* • *Direct*	Low	Minor beneficial (soil re- use) and Minor adverse (waste)	Local	Minor beneficial for re-use and Minor Adverse for waste (Not significant)	Efforts should be made to source local material, or reuse of material within the wider scheme. Consideration should be given to the design to maximise off-site construction which will reduce	Negligible

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
							both materials used and waste generated on-site. Where possible, recycled and secondary aggregates should be specified in the design, thereby reducing the demand for virgin material.	
Physical Effects: *ground conditions*	**Topography**	• *Negative* • *Temporary* • *Short Term* • *Direct*	Low	Negligible	Local	Negligible (Not Significant)	No mitigation / enhancement measures required over and above designed mitigation.	Negligible
	Soil erosion	• *Negative* • *Temporary* • *Short Term* • *Direct*	Low	Negligible	Local	Negligible (Not significant)	Limiting the duration of soil exposure and timely reinstatement of vegetation or hardstanding to prevent soil erosion. Hydro-seeding or covering of surcharged areas / stockpiles where necessary	Negligible

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
							to reduce soil erosion. Limiting the area of earthworks at any one time to reduce temporary effects on topography, soil compaction and erosion.	
	Ground stability & soil compaction	• *Positive* • *Permanent* • *Long Term* • *Indirect*	Low	Negligible	Local	Negligible (Not significant)	Limiting the area of earthworks at any one time to reduce temporary effects on topography, soil compaction and erosion.	Negligible
	Sensitive sites - SSSI	• *Negative* • *Permanent* • *Long Term* • *Direct*	High	Negligible	Local	Negligible (Not Significant)	It is anticipated that further assessment of the ground conditions and designed mitigation/remedial measures will be undertaken as part of the detailed design to reduce any potential effects impacting the geology at the	Negligible

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
							SSSI where necessary.	
Operation								
Land Contamination: *human health, controlled water and property receptors*	**Contamination from on-site sources**	• *Negative* • *Permanent* • *Long Term* • *Direct*	Moderate (controlled water), Moderate (properties), and Low (human health)	Medium	Local	Minor (Not Significant)	No mitigation / enhancement measures required over and above designed mitigation.	Negligible
Waste Soils and Soil Reuse: *soils*	**Generation of waste soils**	• *Temporary* • *Long Term* • *Indirect*	Low	Negligible	Local	Negligible (Not Significant)	No mitigation / enhancement measures required over and above designed mitigation.	Negligible
Physical Effects: *ground conditions*	**Topography**	• *Negative* • *Temporary* • *Short Term* • *Direct*	Low	Negligible	Local	Negligible (Not Significant)	No mitigation / enhancement measures required over and above designed mitigation.	Negligible
	Soil erosion	• *Negative* • *Temporary* • *Short Term* • *Direct*	Low	Negligible	Local	Negligible (Not Significant)	No mitigation / enhancement measures	Negligible

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
							required over and above designed mitigation.	
	Soil compaction and ground stability	• *Positive* • *Permanent* • *Long Term* • *Indirect*	Low	Negligible	Local	Negligible (Not Significant)	No mitigation / enhancement measures required over and above designed mitigation.	Negligible
Cumulative and In-combination								
Land Contamination: *human health, controlled water and property receptors*	**Increase in the mobilisation of contaminants in the air, ground and groundwater through the disturbance of a larger area of potentially contaminated ground mobilising contaminants**	• *Negative* • *Temporary* • *Short Term* • *Direct / Indirect*	Moderate (controlled water), Moderate (properties), and Low (human health)	Negligible	Local / Borough / District	Negligible (Not Significant)	It is anticipated that the Proposed Development will be subject to PPW and will require mitigation and control measures to be adopted during the construction through CEMPs to reduce impacts to the environment including dust generation and potential mobilisation of contaminants.	Negligible
Physical Effects: *ground conditions*	**Destabilisation of ground where developments are very close**	• *Negative* • *Temporary* • *Short Term*	Low	Negligible	Local / Borough / District	Negligible (Not Significant)		Negligible

11 SUMMARY

INTRODUCTION

11.1.1 This chapter of the ES provides a summary of the various technical assessments which have been undertaken as part of the EIA process.

LANDSCAPE AND VISUAL

Introduction

11.1.2 An assessment of the Proposed Development upon the receiving environment: landscape elements associated with the Application Site, LANDMAP aspect areas, landscape designations, and visual receptors has been undertaken.

Assessment Approach

11.1.3 The assessment has been carried out with regards to the appropriate guidance Photographs and site visit were carried out in June 2019 when trees and hedgerows were in leaf and vegetative screening present. Where relevant this has been taken into account during the assessment of potential effects.

Baseline Conditions

11.1.4 The site visit has helped to ascertain the condition of the landscape elements associated with the Application Site, and level of inter-visibility with the surrounding landscapes and potential visual receptors.

11.1.5 Planning policies and published documents in relation to solar energy schemes and landscape sensitivity have been reviewed. The published landscape character assessments, description for the relevant LANDMAP aspect areas, and the Brecon Beacons National Park Management Plan have also been used.

Assessment of Likely Significant Effects

Operational Phase

11.1.6 The assessment of the LANDMAP aspect areas has concluded that the following aspect areas are likely to be subject to significant effects upon their character:

- Visual & Sensory Layer: BRCKNVS118 Dorwen ar Gledd;
- Historic Landscape Layer: BRCKNHL595 Mynydd Du;
- Cultural Landscape Layer: BRCKNCL847 Brecon Beacons National Park.

11.1.7 It is worth reiterating that the significant effects would be only experienced locally, on the periphery of these aspect areas, where views of the Proposed Development might change the appreciation of these particular aspect areas. The significant effects would not apply to the whole of the aspect areas.

11.1.8 With regard to the Brecon Beacons National Park it transpired that its landscape character would be subject to some localised moderate significant effects. These would relate to the Landscape Character Area (LCA) 4 Waterfall Country and Southern Valleys and LCA 2 Y Mynydd Du. These two LCAs coincide with the LANDMAP aspect areas which have been assessed as experiencing negligible neutral and not significant effects with localised moderate significant effects within

approximately 1km radii of the Proposed Development. Such significant effects would therefor occur only on the periphery of the LCA 4 Waterfall Country and Southern Valleys and LCA 2 Y Mynydd Du. The overall landscape character of the Brecon Beacons National Park and its perception would not be changed or redefined. With regard to the National Park's Special Qualities, these would not be redefined or significantly affected.

11.1.9 With regards to viewpoint assessment only three out of ten identified viewpoints have been assessed are subject to significant effects:

- Viewpoint 1;
- Viewpoint 3; and
- Viewpoint 4.

11.1.10 The PRoW which skirts the Application Site to the east would, be subject to significant effects. With regard to the receptors travelling along the various PRoW and open Access Land to the south west and south, these are likely to be subject to moderate adverse and significant effects where the visibility of the Proposed Development is more frequent. Such effects, however, are the result of high sensitivity of the receptors rather than the magnitude of change.

Mitigation and Enhancement

11.1.11 A number of mitigation measures have been implemented during the design stage and these relate to the protection of boundary vegetation, location and alignment of access tracks, location of ancillary infrastructure such as substations and transformers but also the location of the construction compound.

11.1.12 In addition, a positive management of existing hedgerows and new woodland planting has been included to reduce the visual effects and reduce the potential change upon the landscape character and visual amenity of the nearby receptors. The new woodland planting has been proposed along the northern with additional hedgerow planting along the eastern boundaries of the northern parcel, and southern boundary of the southern parcel.

11.1.13 With regards to static views, the residual effects upon the receptors at Viewpoint 1, Viewpoint 3, and Viewpoint 4 would remain significant during the first 5-8 years. After that period the residual effects for Viewpoint 1 are likely to diminish to negligible. This takes into account the existing context, presence of wind farms and open cast mine in the view. The residual effects for the remaining Viewpoints 3 and 4 would not change.

11.1.14 With regard to the low lying section of the public footpath associated with Viewpoint 1, along the eastern boundary of the Application Site, the residual effects are likely to be negligible neutral. The residual effects for other more elevated sections of PRoW, however, would remain significant.

Cumulative and In-combination Effects

Construction and Decommissioning Phases

11.1.15 Landscape character and visual effects are likely to be similar or identical during the construction and decommissioning phases, thus are discussed together.

11.1.16 The assessment of the LANDMAP aspect areas has concluded that the following aspect areas are likely to be subject to significant effects upon their character during the construction phase:

- BRCKNGL773 Cefn Maw – low cumulative degree of change, resulting in moderate adverse significant effects;
- BRCKNCL847 Brecon Beacons National Park – low cumulative degree of change, resulting in moderate adverse and significant effects locally; and
- BRCKNVS118 Dorwen ar Gledd – localised low degree of change in cumulative terms but negligible for the whole of this aspect area, thus moderate adverse and significant effects locally. However, effects upon the whole of this aspect area would be negligible neutral;

11.1.17 With regard to cumulative visual effects during the construction phase, the majority of the identified receptors would be screened from both or one of the cumulative schemes.

11.1.18 Three viewpoints, however, have been assessed as subject to significant cumulative effects due to the additional areas under construction, construction traffic, and change to the character of the landscape:

- Viewpoint 1 – medium magnitude of change and temporary major significant cumulative effects;
- Viewpoint 3 – medium magnitude of change and temporary major significant cumulative effects; and
- Viewpoint 4 – medium magnitude of change resulting in temporary major significant cumulative effects;

11.1.19 In addition, the PRoW associated with Viewpoint 1, and those that skirt both developments would be subject to significant temporary visual effects. The proximity to the construction site, movement, and change in the visual context would be unavoidable and difficult to control at this stage.

Operational Phase

11.1.20 None of the landscape receptors: aspect areas and the Brecon Beacons National Park have been assessed as subject to significant cumulative effects during the operational stage of the Proposed Development.

11.1.21 With regards to visual amenity only receptors at Viewpoints 1, 3 and 4, have been assessed as subject to significant cumulative effects. The residual cumulative effects at all three viewpoints would remain moderate and significant at Year 5. It is likely that due to the increasing vegetative screening the effects at Viewpoint 1 would diminish to negligible neutral and not significant at Year 8 – 10.

Conclusion

11.1.22 The assessment has concluded that there would be some localised significant effects but in majority of cases these can be mitigated, including the cumulative effects. Overall, the Proposed Development has been considered as responding well to the characteristic of the receiving environment, mitigating visual effects, whilst not compromising the requirements and technical aspects of this solar energy scheme.

BIODIVERSITY

Introduction

11.1.23 An assessment of the likely significant effects of the Proposed Development on biodiversity has been undertaken.

Baseline conditions

11.1.24 An Extended Phase 1 habitat survey was undertaken on the 14th June 2019. The survey recorded habitat within the Application Site and aimed to establish the presence or potential presence of protected and notable species. A Breeding Bird Survey was also undertaken on the 14th June 2019. A variety of species typical of rural areas were recorded singing or showing some evidence of activity within the Application Site including species of conservation value; skylark and yellowhammer. The vegetation suitable for nesting bird species on Site is mainly restricted to hedgerows (and associated trees), however, ground nesting species such as skylark and grey partridge may utilise improved grassland for nesting purposes.

11.1.25 Statutory and non-statutory designated sites were identified within a 5km radius of the Application Site using the (MAGIC) website, along with the JNCC and Natural England websites. BIS provided records of protected and notable species and non-statutory designated sites within 2km of the Application Site boundaries. The Application Site does not form part of any statutory or non-statutory designated site for nature conservation but one statutory site designated for its geological features is located 140m to the west of the Site. There are no designated sites of European interests protected for their mobile qualifying interests (e.g. birds or bats) within 10km of the Site. The nearest non-statutory designated site for nature conservation is Pant-y-Brwyn SINC and is located approximately 500m west of the Application Site boundaries. There will be no direct effects on habitats or species within these sites, as construction activity will be contained within the Application Site boundaries.

11.1.26 Habitats within the Application Site are dominated by improved grassland with a small areas of broad-leaved semi-natural woodland to the east of the Site. Fields are bounded by hedgerows with occasional young trees which have negligible bat roosting potential. All the trees will be retained within the Site.

11.1.27 The most optimal habitats within the Application Site, particularly the linear features of hedgerows are likely to provide moderate commuting and foraging opportunities for bats. No fragmentation or severance effects will arise and foraging and commuting opportunities for bats are likely to be improved by the proposed landscape planting of new hedgerows and species diverse meadow grasslands.

11.1.28 No great crested newts were found within 2km during the desk study. No ponds are present on Site but five water bodies were identified (from aerial and OS maps) with 250m. It was not possible to access any of the five ponds during the Extended Phase 1 habitat survey. Three of these ponds (P1, P2, P3) were however assessed for their amphibian habitat suitability in 2013 as part of a planning application on nearby land and were either dry or had poor suitability[1].

11.1.29 The lack of local records, poor habitat suitability of ponds surveyed previously within 250m, absence of any on-site waterbodies and low value terrestrial habitat within the proposed construction area indicates that it is highly unlikely that great crested newts are present within the Application Site.

11.1.30 Habitat connectivity will be maintained around the Application Site during works through the retention and protection of hedgerow and tree boundary features. The implementation of standard good practice protection measures during the

[1] Unknown Site Title (2015) *Environmental Statement* LDA Design Consultancy LLP, London

construction works will be sufficient to avoid significant impacts on amphibian and reptile populations potentially present.

11.1.31 Habitats present on Site are suitable for foraging and breeding birds in the form of grassland, hedgerows and trees. If works take place in the bird breeding season, suitable measures will be required to be set in place to ensure legal compliance, including pre-construction nest checks, and avoidance of works likely to harm nesting birds or their young, as set out in the Wildlife and Countryside Act 1981 (as amended).

Likely Significant Effects

11.1.32 No significant residual effects are anticipated on statutory or non-statutory designed sites or habitats or on protected or notable species, including bats, birds, amphibians or other species in relation to the Proposed Development or in-combination with other proposed developments in the wider landscape.

Mitigation and Enhancement

11.1.33 Mitigation and enhancement measures will include the following:

- A site layout and planting plan that includes species-diverse grassland creation, hedgerow planting and infilling as well as tree planting;
- Pollution prevention and control measures during construction;
- Pre-construction nesting bird checks undertaken if works commence during the breeding bird season (generally 1st March to 31st August inclusive);
- A pre-construction badger survey;
- Gaps positioned in the base of the perimeter fence in order to allow mammal species (badger, brown hare and West European hedgehog) to use the habitats on Site; and
- A minimum of six bat roost boxes and six bird boxes located on suitable mature and semi-mature trees along the Application Sites field boundaries.

Conclusion

11.1.34 The Proposed Development, following the adoption of the proposed mitigation and enhancement measures, will not have significant adverse effects on any statutory or non-statutory site designated for nature conservation, nor on habitats or protected and notable species.

CULTURAL HERITAGE AND ARCHAEOLOGY

Introduction

11.1.35 An assessment of the likely significant effects upon cultural heritage receptors including designated and non-designated historic assets, buried archaeological remains, historic earthworks, structures, landscapes and all other aspects of the historic environment has bee undertaken.

Baseline

11.1.36 There are no designated historic assets located within the Application Site. Anticipated non-designated historic assets located within the Application Site comprise Bryn Henllys post-medieval / modern stock enclosure, and possible historic mining and agricultural remains. None of these would be considered historic assets of the highest significance, and none would be anticipated to require

preservation in situ. Of relevance, the larger part of the Application Site has already been truncated by later 20th-century opencast mining. Any remains that may have survived buried within the footprint of the opencast works are likely to have been removed.

11.1.37 The Application Site does not contribute to the setting or heritage significance of any historic assets within its wider environs. This includes Grade II Listed Henllys Vale Colliery Limekilns, Grade II Listed Henllys Vale Colliery Chimney, Grade II Listed Henglyn Isaf Farmhouse, Grade II Listed Bethel Independent Chapel, the five Grade II Listed buildings at Heol Giedd, Cwm Giedd, and any Scheduled Monuments along the lower reaches of the Black Mountains, north of the Application Site. The significance of all of these assets would be preserved under the proposals.

Likely Significant Effects

11.1.38 No significant effects have been identified, either as a result of direct truncation of archaeological remains or indirectly as a result of changes to setting.

Mitigation and Enhancement

11.1.39 Given that no significant effects have been identified in relation to any heritage assets, either as a result of direct truncation or indirectly as a result of changes to setting, no mitigation measures would be anticipated to be required.

11.1.40 In relation to the Bryn Henllys enclosure, previous trial excavations undertaken by CPAT have demonstrated the recent date and low significance of this asset. Archaeological monitoring during panel installation is considered an appropriate form of mitigation.

Cumulative and In-combination Effects

11.1.41 No cumulative effects are anticipated as a result from the Proposed Development in respect of cultural heritage.

Conclusion

11.1.42 The assessment has not identified anything in respect of cultural heritage that would preclude development of the nature and on the scale proposed within the Application Site.

TRANSPORT AND ACCESS

Introduction

11.1.43 This chapter assesses the traffic and transport related effects relating to the Proposed Development during the construction, operational and decommissioning phases.

Baseline

11.1.44 The approved Bryn Henllys solar farm is located to the immediate east of the Application Site, with access to the Application Site proposed to be routed through the consented site and constructed in tandem in order to minimise construction related effects.

11.1.45 The approved Bryn Henllys solar farm, takes access from the existing access from Palleg Road, which connects with the A4068, via Cwmphil Road. This existing access was used for the previous open cast minerals extraction which ceased in 2003, as such is of a standard and scale to accommodate regular HGV traffic.

11.1.46 Byway Open to all Traffic (BOAT) No. 7 continues from Palleg Road along the northern boundary of Bryn Henllys and between the two parcels of Bryn Henllys Extension, whilst footpath 122A routes along the eastern side of the northern parcel connecting with BOAT No. 7 to the south. Further public footpaths are located in the surrounding area.

Assessment of Likely Significant Effects

11.1.47 The main traffic and transport related environmental effects are associated with the movement of heavy goods vehicles (HGVs) to and from the Application Site during the construction phase. The assessment of the effects of construction traffic considers the implications for pedestrians, cyclists and horse riders, as well as the effects on the road network. Solar Farms when operational do not give rise to significant traffic movements. Transport implications of decommissioning the Solar Farm at the end of its operational period are also considered.

11.1.48 The same construction access will be used for the Proposed Development as proposed for the approved Bryn Henllys solar farm, with materials transferred within Bryn Henllys and the site. The construction of the Proposed Development would be undertaken at the same time as Bryn Henllys solar farm, resulting in an extension to the previous 30 week construction period to circa 45 weeks.

11.1.49 Over the 3 month construction period of the solar farm it is it is estimated that the Application Site will typically generate up to 4 HGV deliveries (8 HGV movements) per day. This is a comparable impact to Bryn Henllys solar farm.

11.1.50 Construction traffic will have an impact on Palleg Road, Cwmphil Road, and Public Rights of Way in the vicinity of the Application Site. Minor, temporary adverse effects are predicted in relation to Palleg Road and Cwmphil Road, which would be further reduced and managed through the implementation of the Construction Traffic Management Plan and no significant effects are predicted to arise in relation to accidents or road safety in any phase of the development. The Proposed Development is therefore not considered to have a materially detrimental impact on the local road network. Public Rights of Way (PROW) in the vicinity of the Application Site will be kept open during construction and decommissioning, although will be temporarily affected by the presence of construction vehicles routing along the farm access track along which BOAT No. 7 and Footpath 122A route. The measures outlined in the CTMP have been designed to minimise effects on users of these PRoW.

Mitigation and Enhancement

11.1.51 The Construction Traffic Management Plan sets out the route and proposals for delivery of materials, plant and labour to and from the Application Site. It covers mitigation including management of deliveries, delivery time restrictions, construction warning signs and management of Public Rights of Way to minimise construction based traffic impacts.

Cumulative and In-combination Effects

11.1.52 The effects during construction will be comparable to Bryn Henllys solar farm, though over an extended construction period. There will however be no significant cumulative effects.

Conclusion

11.1.53 Adopting best practice construction management the effect of construction of the Proposed Development will be minimised. The effect of the Proposed Development long-term during operation on local roads and PROW will be negligible.

HYDROLOGY, FLOOD RISK AND SURFACE WATER DRAINAGE

Introduction

11.1.54 An assessment of the likely effects of the Proposed Development on the water environment (including flood risk and the water quality of nearby watercourses) has been undertaken.

Baseline Conditions

11.1.55 The Application Site is currently agricultural land, mainly arable with some grassland. The topography varies across the Application Site with a general trend of existing levels falling towards the south/south-west of the Application Site.

11.1.56 A number of drainage ditches intersect the Application Site in conjunction with hedgerows used as agricultural boundaries for adjoining fields. There is a formalised stone lined ditch flowing east, from west, towards the Afton Twrch, this not located with the Application Site however is culverted under the existing roads that connect the north and south parcels of the Proposed Development.

Likely Significant Effects

11.1.57 The construction of the Proposed Development will temporarily disrupt onsite surface water drainage. The resultant flood risk implications on the receiving water bodies without mitigation are considered to be Minor Adverse.

11.1.58 Potentially polluting activities and accidental spillages and leakages may occur during the construction and operation of the Proposed Development which could have an effect on local water quality.

Mitigation and Enhancement

11.1.59 Good site management, adequate contingency planning, application of pollution prevention principles and best practice construction techniques will reduce the risk of a significant water pollution event occurring.

11.1.60 The Application Site has been designed so that it respects, maintains and enchases, through the use of swales, the existing drainage regime. Through maintaining a suitable vegetation cover throughout the lifetime of the development it will protect the existing drainage regime to be retained.

Cumulative and In-combination Effects

11.1.61 If the effects of the Proposed Development and other developments are considered together the cumulative effect of developments on hydrology and flood risk is also 'Negligible' assuming appropriate mitigation measures are implemented.

Conclusion

11.1.62 Residual impacts of the proposed solar farm development will range between 'Permanent Minor Beneficial' to 'Temporary Minor Adverse'. The mitigation measures outlined above which minimise the risk of a pollution incident affecting water resources and provide a small degree of betterment with respect to flood risk therefore resulting in no significant effects as a result of the Proposed Development.

GROUND CONDITIONS AND CONTAMINATION

Introduction

11.1.63 The matter of ground conditions at the site, including its coal mining history, have been considered. An assessment of potential effects on ground conditions and sensitive receptors (i.e. human health, controlled waters, and the environment) during construction, operation and decommissioning of the Proposed Development has been undertaken. The assessment includes consideration of potential effects relating to topography, ground stability, contaminated land, soil compaction and soil erosion, re-use of soils, waste soils and potential polluting pathways. Where necessary, relevant mitigation and remedial measures are proposed in accordance with relevant legislation, policy and guidance.

Baseline Conditions

11.1.64 The history of the site and the surrounding land was investigated via a desk-based assessment. Published data sources were used to establish the geological conditions beneath the Application Site, identify areas of potentially contaminated land and potential land instability. The review also identified potential pollutant linkages and facilitated a risk assessment for each of the identified pollutant linkages.

11.1.65 The Application Site comprises approximately 25.6 hectares of generally restored opencast mining and currently used as agricultural land. Historical mapping has indicated the majority of the southern portion of the Application Site and the eastern half of the northern parcel of the Application Site were subject to opencast coal mining.

11.1.66 Made ground associated with opencast works is anticipated across the site. Made ground is likely to consist of opencast backfill composed of rockfill and unsaleable Coal Measures mudstone, siltstone and occasional sandstone.

11.1.67 A preliminary risk assessment concluded that there was a potential moderate to low risk to human health and controlled water receptors, mostly associated with off-site historical land uses and the potential presence of unknown filled (Made Ground) areas on the Application Site.

Likely Significant Effects

11.1.68 With the design mitigation, risks identified to human health and controlled waters are assessed as very low to low. Compared to the existing baseline, the level of risk to receptors has been reduced due to the design mitigation for the prevention of impacts from land contamination.

11.1.69 The post-mitigation impacts from land contamination are therefore considered to be permanent, long term and direct. An overall Adverse Negligible significance of effect has been predicted, which is classed as Not Significant

11.1.70 With the design mitigation incorporated, risks identified to ground stability at the site are assessed as very low. Compared to the existing baseline, the level of risk to receptors has remained generally the same due to the design mitigation for the prevention of impacts from ground instability.

11.1.71 The post-mitigation impacts on land instability are therefore considered to be permanent, long term and direct. An overall Adverse Negligible significance of effect has been predicted, which is classed as Not Significant.

Mitigation and Enhancement

11.1.72 Mitigation measures will be incorporated into the design, construction and operation of the Proposed Development to reduce impacts of physical effects, and effects associated with land contamination, soil waste and soil re-use.

11.1.73 If proper control measures are being followed during the construction and operation phases of the Proposed Development, the potential onsite impacts are expected to be of 'negligible to low' effect and not significant.

11.1.74 Designed mitigation generally will be in accordance with the relevant legislation, regulations, best practice guidance and pollution prevention methods.

Cumulative and In-combination Effects

11.1.75 If the effects of the Proposed Development and the adjacent solar installation to the east are considered together, the cumulative effect of developments of ground conditions and contamination is considered 'Negligible' and Not Significant assuming appropriate mitigation measures are implemented.

Conclusion

11.1.76 On completion of recommended ground investigation works and subsequent assessment of the potential contamination sources, the potential construction and operational impacts will be further assessed, and appropriate mitigation developed to minimise the potential impacts. However, in view of the information currently available and following the implementation of the mitigation measures outlined within this Chapter, it is considered that residual significant effects upon geology and land quality will be Negligible.

11.1.77 Detailed ground investigations will be required in order to provide foundation recommendations at the Site and discharge relevant planning conditions, should planning permission be granted.

11.1.78 At this stage of review, it is considered that there are no insurmountable environmental, engineering, or geotechnical constraints associated with the Proposed Development.

11.1.79 Therefore, the Proposed Development at the Application Site is considered to be acceptable and there would be no adverse significant effects.

SUMMARY

11.1.80 The design of the Proposed Development has taken account of the likely significant environmental effects and where necessary mitigation measures form an integral part of the Proposed Development to ensure that the environment is suitably protected.

11.1.81 The ES demonstrates that there are no overriding environmental constraints which would preclude the Proposed Development on the Application Site.

12. GLOSSARY, ACRONYMS AND REFERENCES

Term / Acronym	Description
Adit	A horizontal passage leading into a mine for the purposes of access or drainage.
AOD (Above Ordnance Datum)	Baseline standard for measuring height usually measured in metres AOD (mAOD)
Attenuation[1]	The breakdown or dilution of contaminated water as it passes through the earth's material.
Aquifer	An aquifer is an underground layer of water-bearing permeable rock, rock fractures or unconsolidated materials
BEGL	Below Existing Ground Level
BGS	British Geological Society
BIS	Biodiversity Information Service
BMPs	Best Management Practices
BMV	Best and Most Versatile
Brownfield	Denoting or relating to sites for potential building development that have had previous development on them.
Cadw	Historic Environment Service of Welsh Government
Capping	Capping involves placing a cover over contaminated material such as landfill waste or contaminated soil. Such covers are called "caps." Caps do not destroy or remove contaminants. Instead, they isolate them and keep them in place to avoid the spread of contamination.
CEMP	Construction Environmental Management Plan A site or project specific plan designed to ensure best practice and/or appropriate environmental management practices are applied throughout the construction, operation and/or demolition phases of a project.
CIEEM	Chartered Institute of Ecology and Environmental Management Professional body of which most professional consultant ecologists are members. Its aim is to raise the profile of professional ecological and environmental management and to promote the highest standards of practice for the benefit of nature and society.
CIRIA	Construction Industry Research and Information Association
CMP	Construction Management Plan
CMRA	Coal Mining Risk Assessment
Coal Levels	A level is a roadway along the strike of the coal strata.
Conceptual Site Model[1]	A Conceptual Site Model is representation of the biological, physical and chemical processes that determine the ways that contaminants move from sources through the environmental media to environmental receptors.

[1] (as referred to in Ground Conditions and Contamination Chapter).

Term / Acronym	Description
Conservation Area	Nearly always applies to an area (usually urban or the core of a village) considered worthy of preservation or enhancement because of its special architectural or historic interest.
Controlled Waters	Controlled waters are defined as virtually all freshwater including relevant territorial waters (extending 3 miles seawards from baseline), coastal waters (water inland of baseline), inland waters, surface water, public supply reservoirs and groundwater.
Design and Access Statement (DAS)	A statement accompanying and supporting an application that sets out the rationale for the design approach and how the Proposed Development would be accessed for a range of users.
Dielectric Fluids	A liquid dielectric is a dielectric material in liquid state. Its main purpose is to prevent or rapidly quench electric discharges. Dielectric liquids are used as electrical insulators in high voltage applications, e.g. transformers, capacitors, high voltage cables, and switchgear (namely high voltage switchgear).
EcIA	Ecological Impact Assessment
EA (Environmental Agency)	An executive non-departmental government body working with responsibilities to protect and improve the environment, including flood risk management
EIA (Environmental Impact Assessment)	Process for identifying the likely significance of environmental effects (beneficial or adverse) arising from a Proposed Development, by comparing the existing environmental conditions prior to development (the baseline) with the environmental conditions during/following the construction, operational and decommissioning phases of a development should it proceed.
ES (Environmental Statement)	Document setting out the findings of an Environmental Impact Assessment
Faults	A fault is a planar fracture or discontinuity in a volume of rock, across which there has been significant displacement as a result of rock-mass movement.
FRA (Flood Risk Assessment)	An assessment as to the current and future flood risk of an area where development is proposed. A FRA is supporting information for a planning application.
Geo-Grid	A geo-grid is geosynthetic material used to reinforce soils and similar materials.
Geotechnical	Relating to practical applications of geological science in civil engineering, mining and soils.
Ground Dissolution	Ground dissolution occurs when water passing through soluble rocks produces underground cavities and cave systems.
ha	Hectare – unit of measurement 100m x 100m, or 10,000m^2
Habitat Suitability Index	A scoring system for evaluating habitat quality for specific species.
Hard Standing	Ground surfaced with a hard material suitable for supporting vehicular movement (e.g. tarmac, compacted gravel, concrete).
HE	High Explosive

Term / Acronym	Description
Hotspots	A small area with a relatively high contaminant concentration in comparison to its surroundings.
IEMA (Institute of Environmental Monitoring and Assessment)	Professional body for EIA and environmental practitioners.
Impervious	Not allowing fluid to pass through.
Landscape and Visual Impact Assessment (LVIA)	A tool used to identify and assess the likely significance of the effects of change resulting from development both on the landscape and as an environmental resource in its own right and on people's views and visual amenity. (GLVIA 3, 2013 p157).
Leaching	Movement of a contaminant from soil, ash, or similar material by the action of percolating liquid, especially rainwater.
Listed Building	Marks and celebrates a building's special architectural and historic interest, and also brings it under the consideration of the planning system, so that it can be protected for future generations.
Local Planning Authority (LPA)	The Council (County, Borough or District) that is empowered by law to exercise statutory town planning functions for a particular area (administrative boundary) of the UK.
Made Ground	An area of land that has been made by people, generally through the reclamation or landfilling. Made ground can consist of natural and/or man made materials/deposits.
MMP	Materials Management Plan
NNR	National Nature Reserve
NRW	Natural Resources Wales
NTS	Non-Technical Summary – Summary document in a non-technical language
Opencast Mine	The activity of taking minerals, especially coal, from the surface of the ground rather than from passages dug under it.
Outcrop	A rock formation that is visible on the surface.
Part IIA Site	A site that is designated as contaminated land under the Environmental Protection Act 1990.
PCB's	Polychlorinated biphenyls
PCC	Powys County Council
Phase 1 Habitat Survey	A habitats survey method originally published by the Nature Conservancy Council in 1990. It is intended to rapidly provide a record of semi-natural vegetation and wildlife habitat over large areas of countryside. It has been modified slightly, or extended, for the purposes of carrying initial assessments as to the likely ecological value of a site and its potential to support protected or notable species.
Plasticity	The plasticity of soil refers to the property of soil to possess plasticity, i.e. get deformed without rupture/breaking under external force.
PPW	Planning Policy Wales

Term / Acronym	Description
Public Right of Way (PRoW)	Footpath, bridleway or byways over which members of the public have a right.
Radon Gas	Radon gas is a colourless, odourless, radioactive element that is a noble gas. It is produced by the radioactive decay of radium and occurs in minute amounts in soil, rocks, and the air near the ground.
Ramsar Site	A Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention. The Convention on Wetlands, known as the Ramsar Convention, is an intergovernmental environmental treaty established in 1971 by UNESCO, which came into force in 1975.
Receptor	A location, feature (ground, watercourse) or individual (person, plant, bird, animal etc) upon which the effects of a proposed development is assessed, i.e. the receiving environment.
Refuse Heaps	An accumulation of refuse/unwanted material and or discarded matter.
RoFRaS	Risk of Flooding from Rivers and Sea
Running Sand	Running sand is the flow of sand into an excavation or void due to water pressure. Running sand hazards can occur where excavations in the sand go below the water table.
Scheduled Ancient Monument	"Nationally important" archaeological site or historic building, given protection against unauthorised change
SCA	Special Conservation Area – European Designation.
Soft Standing	Ground that is not covered by a layer considered difficult to excavate/remove (e.g. grass, bare ground, vegetation).
SPA	Special Protection Area – European Designation.
SSSI	Site of Special Scientific Interest - conservation designation denoting a protected area in the United Kingdom
SINC	Sites of Importance for Nature Conservation. Non statutory designation for areas which are locally important for the conservation of wildlife. They are identified and selected for the habitats and species that they contain.
SuDS	Sustainable Drainage System A drainage system designed to drain surface water in a manner that will provide a more sustainable approach than what has been the conventional practice of routing run-off through a pipe to a watercourse.
Subsidence	The gradual caving in or sinking of an area of land.
Subterranean	Existing, occurring, or done under the earth's surface.
Superficial Deposits	Superficial deposits refer to geological deposits typically of Quaternary age (less than 2.6 million years old). These geologically recent unconsolidated sediments may include stream channel and floodplain deposits, beach sands, gravels and glacial drift.
SWMP	Site Waste Management Plan

Term / Acronym	Description
Tips	A tip is a pile built of accumulated spoil – the overburden, or other waste material, removed during ore and or coal mining.
The Town and Country Planning (EIA) Regulations 2017 (Wales) (as amended, 2019).	Regulations that ensure sustainable economic development and a better environment by assessing the environmental consequences (positive and negative) of projects prior to the decision to move forward with the proposed development.
TAN	Technical Advice Note
Turbid	Water or a solution that is cloudy, opaque, or thick with suspended matter.
Unexploded Ordnance (UXO)	Unexploded ordnance, unexploded bombs, or explosive remnants of war are explosive weapons that did not explode when they were employed and still pose a risk of detonation, sometimes many decades after they were used or discarded.
Zone of Theoretical Visibility (ZTV)	A map, usually digitally produced, showing areas of land within which a development is theoretically visible. (GLVIA 3, 2013 p159).

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