



Environmental Statement Volume 1: Main Report

Bodelwyddan Solar and Energy Storage

September 2025

Prepared for:
Bodelwyddan Solar and Energy Storage
Ltd

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Environmental Statement

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1 Introduction

1.1 Project Background

- 1.1.0 This Environmental Statement (ES) has been prepared by Stantec UK Ltd (Stantec) on behalf of Bodelwyddan Solar & Energy Storage Limited (hereinafter referred to as the 'Applicant'), a Special Purpose Vehicle (SPV) owned by Island Green Power UK Limited to accompany a Development of National Significance (DNS) application for the construction, operation and decommissioning of a proposed solar photovoltaic (PV) electricity generating system and battery energy storage system (BESS), associated solar arrays, inverters, transformers, cabling, substations, access tracks, landscaping and ecological enhancements, fencing/CCTV and associated ancillary development for 40 years (the 'Proposed Development') on Land near Bodelwyddan, North Wales (the 'Site'). A Site Location Plan is provided in **Appendix A.1** and a full description of the Proposed Development is provided in **Chapter 3** of this ES.
- 1.1.1 This ES presents the findings of the Environmental Impact Assessment (EIA) undertaken in accordance with the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017¹ (the EIA Regulations) and identifies the likely significant environmental effects of the Proposed Development during construction, operation and decommissioning.

1.2 Terms and Definitions

- 1.2.0 For ease of reference the following terms have been used in the ES (unless the context dictates otherwise):

General Terms:

- **'the Site'** – the total site area being developed including the Solar Site, BESS Site and Cable Corridor, as per **Appendix A.1** and described in **Chapter 2**;
- **'Solar Site'** – the site area being developed for the PV solar panels, inverters, switchroom, ecological mitigation and enhancement and ancillary development consisting of six parcels of land, as described in **Chapter 2**;
- **'BESS Site'** – the site area being developed for the BESS units, inverters, transformer, substation and ancillary development, as set out in **Chapter 2**;
- **'the Proposed Development'** – the application for which full planning permission is being sought as a DNS, as set out in **Chapter 3**;
- **Cable Corridor** – the area within which the underground electrical cables will be laid, and which connects the Solar Site to the BESS Site and subsequently the adjacent Point of Connection at Bodelwyddan Substation;
- **'the Study Area'** – the area that may potentially be impacted by the Proposed Development. The Study Area varies from topic to topic and is described in each chapter;
- **'DCC'** – Denbighshire County Council, the local planning authority;
- **'CCBC'** – Conwy County Borough Council, the local planning authority;
- **'the Applicant'** – Bodelwyddan Solar & Energy Storage Limited.

¹ [The Town and Country Planning \(Environmental Impact Assessment\) \(Wales\) Regulations 2017](#)



EIA Terms:

- Primary Mitigation – modifications to the location or design of the Proposed Development made during the pre-application phase that are an inherent part of the project, and do not require additional action to be taken;
- Secondary Mitigation – actions that will require further activity in order to achieve the anticipated outcome. These may be imposed as part of the planning consent, or through inclusion in the ES;
- Tertiary Mitigation – actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects;
- Impact – in relation to the outcome of the project (e.g. the removal of habitat);
- Effect – the consequent implication in environment terms (e.g. the loss of a potential breeding habitat for a protected species or the reduction in local air quality); and
- Planning Drawings – the plans that define the Proposed Development on which the EIA will be based, shown in **Appendix A.9**;

1.3 Environmental Statement and Other Documents

- 1.3.0 EIA is the process by which development proposals deemed likely to have significant environmental effects are appraised. EIA is described as a means of drawing together, in a systematic way, an assessment of a development's likely significant environmental effects. This helps to ensure that the importance of the predicted significant environmental effects, and the scope for reducing them, are properly understood before a decision is made. Information on the likely significant effects of the Development has been gathered and is presented in this document, the ES. The ES will inform the Welsh Ministers of the likely significant environmental effects of the Development during construction, operation and decommissioning, and proposes mitigation measures to prevent, reduce and/or offset any significant adverse effects on the environment.
- 1.3.1 The Development falls under the category 'Energy industry projects' in section 3(a) of the Table within Schedule 2, of the EIA Regulations. The Site is not located in a 'sensitive area' as defined by the EIA Regulations however the Development exceeds the 0.5ha threshold. The Applicant did not seek a screening opinion² as it was considered that the nature and scale of the Development was such that significant effects on the environment are likely and therefore deemed to be EIA development. Further information on the scoping of the ES is set out in **Chapter 2** of this ES.
- 1.3.2 A request for an EIA Scoping Opinion Request (**Appendix A.2**) was submitted by Stantec to PEDW on 19 December 2024 (planning reference DNS CAS-03950-F9K3T4). An EIA Scoping Opinion was received on 28 February 2025 and is provided in **Appendix A.3**.

1.4 Project Team

- 1.4.0 Regulation 17(4)(a) of the EIA Regulations require that, to ensure the completeness and quality of environmental statements, *"an environmental statement must be prepared by persons who in the opinion of ... the Welsh Ministers ... have sufficient expertise to ensure the completeness and quality of the statement"*. In accordance with Regulation 17(4)(b) of the EIA

² A Screening Opinion is a planning authority's view as to whether a development is likely to result in significant effects on the environment in accordance with EIA Regulations.



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Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare the ES is provided in **Appendix A.4**.

- 1.4.1 The project team working on elements supporting the ES are provided in **Table 1.1** below. On behalf of the Applicant and in accordance with the EIA Regulations, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare the ES is provided in **Appendix A.5**.

Table 1.1: EIA Project Team

Project Team Member	Team Position
Stantec	Planning, EIA Assessment, Population and Human Health, Climate Change, Ground Conditions and Contaminated Land,
Environmental Dimension Partnership (EDP)	Biodiversity, Landscape and Visual Effects
Cotswold Archaeology	Built Heritage and Archaeology
Calibro	Flood Risk and Water Resource

1.5 Organisation of the EIA Report

- 1.5.0 Regulation 17 and Schedule 4 of the EIA Regulations sets out the information an ES should include. **Table 1.2** below shows where the Regulation 17 information has been provided in this ES.

Table 1.2: Location of Information Required by Regulation 17 of the EIA Regulations

Specified Information		Location within ES
<i>Reg 17 (3) An environmental statement is a statement which includes at least—</i>		
(a)	a description of the proposed development comprising information on the site, design, size and other relevant features of the development;	Chapter 3
(b)	a description of the likely significant effects of the proposed development on the environment;	Technical Chapters 6-12
(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	Chapter 3 and Technical Chapters 6-12
(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 effects of the Development on the environment;	Chapter 4
(e)	a non-technical summary of the information referred to in sub-paragraphs (a) to (d);	Separate standalone NTS
(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	Technical Chapters 6-12
<i>Reg 17 (4) An environmental statement must—</i>		
(a)	be prepared by persons who in the opinion of the relevant planning authority or the Welsh Ministers, as appropriate, have	See statement attached to the ES Main Text Contents Page.



Specified Information		Location within ES
	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 the expertise of the person who prepare the environmental statement.	A 'statement of expertise' as required by Regulation 18(4)(b) of the EIA Regulations is provided in Chapter 1 and Appendix A.4.
(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 subject to that opinion or direction);	The latest scoping opinion is provided in Appendix A.3.
(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	Technical Chapters 6-12
(e)	take into account other environmental assessments required under F1 ³ or any other provision of domestic legislation, with a view to avoiding duplication of assessment.	Technical Chapters 6-12

1.6 Report Structure

1.6.0 Volume 1 of this ES comprises 16 Chapters and is supported by Figures and Technical Appendices (which are located within a separate Volume 2). A Non-Technical Summary (NTS) of the full ES is provided as a separate standalone document.

1.6.1 The Structure of the ES is set out in **Table 1.3** below:

Table 1.3 ES Structure

Chapter No.	Chapter Title	Description
Volume 1 - Chapters and supporting figures		
1	Introduction	Introduction to the ES, EIA requirements, details of project team, ES organisation and availability.
2	EIA Assessment Methodology	Methods used to prepare each chapter, description of ES structure and content, generic significance criteria, scoping and consultation.
3	Site and Development Description	Site description and details of the Proposed Development. Summary of effects with respect to climate change, energy and sustainability.
4	Alternatives and Design Evolution	Outline of the main alternatives considered by the Applicant.
5	Construction Methodology and Phasing	Details of anticipated construction programme and construction methodology for the Proposed Development.
6	Flood Risk and Water Resources	Assessment of likely significant effects of the Proposed Development on flood risk and water resources.
7	Archaeology	Assessment of likely significant effects of the Proposed Development on potential buried archaeology

³ [The Town and Country Planning \(Environmental Impact Assessment\) \(Wales\) Regulations 2017](#)



Chapter No.	Chapter Title	Description
8	Climate Change	Assessment of likely significant effects of the Proposed Development on Climate Change.
9	Ground Conditions and Contaminated Land	Assessment of likely significant effects of the Proposed Development on Ground Conditions.
10	Biodiversity	Assessment of the effects of the Proposed Development with respect to Biodiversity.
11	Landscape and Visual	Assessment of the effects of the Proposed Development with respect to Landscape character and features and Views.
12	Built Heritage	Assessment of the effects of the Proposed Development with respect to above ground heritage assets.
13	Other Issues Considered	Assessment of the effects of the Proposed Development with respect to topics scoped into the ES but not contained within their own Chapter.
14	Impact Interactions	Assessment of the potential for the potential of impact interactions between each topic chapter of the ES.
15	Schedule of Mitigation and Monitoring	Summary of the mitigation and monitoring measures proposed throughout the ES to avoid significant adverse effects and enhance beneficial effects.
16	Statement of Significance	Summary of the conclusions of the ES.
Standalone Document	Non-Technical Summary	Summary of the ES in non-technical language.
Volume 2 - Appendices		
Technical Appendices		Technical data and reports to support the chapters in Volume 1.

- 1.6.2 In accordance with the Scoping Direction (planning reference DNS CAS-03950-F9K3T4), several topics were identified as being relevant to the ES but do not warrant standalone Chapters within the report. Nonetheless, these topics have been appropriately considered and integrated within the ES. **Table 1.4** below provides information on these topics and where to find the information relating to these scoped in topics.

Table 1.4; Topics without dedicated Chapters

Topic	Details	Location within ES
Population and Human Health	Population and Human Health is scoped into the ES but not as a standalone Chapter.	Appendix I.1
Socio-economics	PEDW agreed that socio-economic impacts can be scoped out but welcomes a stand-alone socio-economic statement.	Socio-Economic Statement, submitted as part of the planning application
Air Quality	Scoped Out of the ES, however, mitigation measures to control construction and decommissioning effects will be outlined in the Outline Construction Environmental Management Plan (oCEMP) and Outline Demolition Environmental Management Plan (oDEMP).	Appendix A.5 - oCEMP Appendix A.6 - oDEMP
Noise	Scoped out but PEDW welcomes standalone technical noise report.	Noise Impact Assessment, submitted as part of the planning application
Transport	Scoped out but PEDW welcomes standalone Construction Traffic Management Plan (CTMP), Transport Statement and oDEMP.	CTMP and TS Socio-Economic Statement, submitted as part of the planning application



Topic	Details	Location within ES
		Appendix A.6 - oDEMP
Agricultural Land Classification	Scoped into the ES. The Agricultural Land Classification (ALC) Survey prepared by Land Research Associates (LRA) (Appendix I.2) was sent to Land Quality Advice Service (LQAS) on 13 February 2025 for validation. LQAS responded on 28 March 2023, in accordance with Technical Advice Note (TAN) 6, Annexe B6, that it had been validated by the Department for Climate Change & Rural Affairs and confirmed that it has been completed by an acceptable standard as per 'Guidelines and Criteria for Grading of Agricultural Land' (MAFF 1988). An area of land (circa 9ha) proposed for ecological mitigation and enhancement was subsequently added into the Site and therefore subject to an ALC survey. As such an updated ALC Survey report was sent to LQAS on 28 July 2025 and validated on 29 July 2025. Therefore, Agricultural Land can be scoped out of the ES. The ALC Report is attached as an appendix to the ES.	Appendix I.2
Material Assets and Waste	Material Assets and Waste (MA&W) is scoped into the ES, although not as a standalone chapter. This is dealt with in Appendices A.5 and A.6.	Chapter 5.5 and 5.6 Appendix A.5 - oCEMP Appendix A.6 - oDEMP
Lighting	Lighting is scoped out of the ES however PEDW welcomes that the oCEMP and oDEMP (included technical appendices to the ES) will include a lighting strategy to minimise light spill to receptors during construction .	Appendix A.5 - oCEMP Appendix A.6 - oDEMP
Major Accidents and Disasters	Scoped in, although does not require a standalone chapter. The risk of BESS fires and pollution prevention is covered in the Outline BSMP and the FCA and Drainage Strategy. The risk of PFAS leaching from the solar panels is covered in the FCA and Chapter 3 – The Proposed Development, of the ES	Appendix I.3 – Outline Battery Safety Management Plan (BSMP) Appendix B.1 – Flood Consequence Assessment (FCA) Appendix B.3 – Proposed Drainage Strategy Chapter 3 – The Proposed Development Section 5.3.9
Utilities	Scoped into the ES in a proportionate manner. The ES needs to explain how the impact on the existing network is to be managed and mitigated.	Chapter 3
Electromagnetic Fields (EMF)	Further information needed to consider the potential impacts from EMF on human health, ecology, communication and utilities.	Appendix I.4

1.6.3 A number of other documents have been submitted to PEDW as part of the planning application. These include:

- Planning Statement;



Environmental Statement

- Design and Access Statement;
- Consultation Report;
- Transport Statement;
- Outline Landscape and Ecology Management Plan (LEMP);
- Green Infrastructure Statement;
- Socio-Economic Report;
- Noise Impact Assessment;
- Geophysical Survey;

1.6.4 Arboricultural Impact Assessment;

- Tree Protection Plan; and
- Tree Constraints Plan.

1.7 Environmental Statement Availability

Comments on the DNS application can either be made to PEDW online via their project portal (<https://www.gov.wales/planning-and-environment-decisions-wales>) using the reference DNS CAS-03950-F9K3T4, or can be forwarded to the following address:

Planning and Environment Decisions Wales
Crown Buildings
Cathays Park
Cardiff
CF10 3NQ

Tel: 0300 0604400

The ES may be purchased in volumes, the costs for which are set out below:

- Non-Technical Summary (NTS) - £15;
- Volume 1: ES Main Text & Figures - £250;
- Volume 2: ES Appendices - £450; and
- Full copy (Volumes 1 and 2 with NTS) of the ES on a data stick - £15

Electronic copies of the ES can be made available. Requests can be made from:

Environmental Planning Team
Stantec UK Limited
Lakeside House,
Blackbrook Business Park,
Blackbrook Park Avenue
Taunton, UK
TA1 2PX

e-mail: taunton.uk@stantec.com

Tel: 018 2321 8940



2 Assessment Method

2.1 Introduction

- 2.1.0 This Chapter sets out the methodology by which the EIA has been carried out. It includes a discussion of the relevant regulations, the EIA process, consultations and over-arching assessment methods. Details of the technical method followed for each topic are presented in each of the technical chapters (**Chapters 6-12**) as appropriate.

2.2 EIA Regulations

- 2.2.0 The EIA Regulations implement EC Directive 85/337/EEC⁴, as amended, into domestic legislation. The initial Directive and its three amendments have been codified by Directive 2011/92/EU⁵. A new Directive 2014/52/EU⁶ was implemented in 2014 and the provisions and requirements were subsequently enacted in the UK, with the relevant Welsh regulations coming into force on 16 May 2017 by way of the EIA Regulations.
- 2.2.1 The EIA Regulations set out the procedures for undertaking an EIA and the information which is required in an ES. This procedure has been followed in this assessment.

2.3 EIA Process

- 2.3.0 In general terms the main stages in the EIA are as follows:
- **Screening** – determining whether a proposed project falls within the remit of the EIA Regulations;
 - **Scoping** – determining the extent of issues to be considered in the assessment and reported in the ES;
 - **Establishing Baseline** – drawing together and reviewing existing available data and undertaking surveys to determine the existing and future baseline conditions;
 - **Assessment and Iteration** – assess likely significant effects of development, evaluate alternatives, provide feedback to design team on potential adverse impacts, modify development or impose parameters, incorporate mitigation, assess effects of mitigated development; and
 - **Preparation of the ES.**

2.4 Scoping

- 2.4.0 Scoping is an important tool for identifying the likely significant effects of a Proposed Development through its design, construction, operation and decommissioning phases and ensures that appropriate mitigation options are considered where necessary.
- 2.4.1 An EIA Scoping Report (**Appendix A.2**) was submitted to PEDW on 19 December 2024 in support of a formal request for a Scoping Direction. The Scoping Report identified the topics proposed to be scoped into and out of the ES and, for those assessments to be included, details of the scope and methodology of the assessments:
- Biodiversity

⁴ [Directive - 85/337 - EN - EUR-Lex](#)

⁵ [Directive - 2011/92 - EN - EIA - EUR-Lex](#)

⁶ [Directive - 2014/52 - EN - EIA - EUR-Lex](#)



Environmental Statement

- Landscape and Visual Effects
- Historic Environment

2.4.2 However, in the EIA Scoping Direction (28 February 2025), PEDW requested that the following topics were also scoped into the ES

- Population and Human Health;
- Flood Risk and Water Resources;
- Archaeology;
- Climate Change;
- Ground Conditions and Contaminated Land;
- Agricultural Land;
- Material Assets and Waste;
- Major Accidents and Disasters;
- Biodiversity;
- Landscape and Visual
- Built Heritage;
- Utilities; and
- Electromagnetic Fields

2.4.3 As a result, this ES has been prepared to fulfil the requirements of the Scoping Opinion and in compliance with regulation 17(4)(c) of the EIA Regulations which requires an ES to be based on the most recent scoping opinion issue and demonstrates in **Table 2.1**.

Table 2.1 Summary of EIA Scoping Opinion Responses

Issue Raised in the EIA Scoping Process from Statutory Consultees	ES Chapter addressed
Denbighshire County Council	
<u>General</u>	
▪ Mitigation measures for the identified significant impacts need to be identified and assessment of the effectiveness of the mitigation measures outlined in the ES. Reasons for impacts considered not significant need to be outlined	Section X.8 of Technical Chapters 6-12
▪ The EIA must identify sensitive receptors, including residential properties within proximity to the whole of the Site, including ancillary developments across all phases of the development from construction to decommissioning	Section X.7 of Technical Chapters 6-12
▪ Two Options of solar panels are being considered. It is assumed that the Glint and Glare Assessment will cover both until a decision is made	Chapter 3 and Appendix I.6
▪ There's a lack of information on construction and decommissioning processes	Chapter 5, Appendix A.5 and Appendix A.6



Issue Raised in the EIA Scoping Process from Statutory Consultees	ES Chapter addressed
In the event less land is required to deliver 100 MW of energy production due to increased efficiency of solar arrays, would arrays be located in less harmful locations first?	This is not a consideration for the ES, as this report assesses the worst case based on the Proposed Development. If less is delivered, that is a matter for the Applicant to determine.
<u>Biodiversity</u>	
The council note a lack of information regarding the proposed landscaping and biodiversity enhancement	Chapter 10
<u>Landscape and Visual Effects</u>	
It is recommended the Study Area is extended beyond 100 m for the Residential Visual Amenity Assessment, and instead guided by theoretical visibility	Chapter 11.4 – Study Area
Forthcoming and consented DNS and NSIP project of relevance should be assessed	Chapter 11
There is a lack of information regarding any landscaping works forming part of the proposal	Chapter 11
<u>Water Resources and Flood Risk</u>	
The Council concur with comments from LLFA and NRW that this chapter is to be scoped into the EIA due to the nature and location of the Proposed Development	Chapter 6
<u>Archaeology</u>	
The Council disagrees that Archaeology should be scoped out of the ES and therefore stated this is to be scoped in as the Council are not convinced sufficient evidence has been provided to scope out the potential significant effects	Chapter 7
<u>Noise and Vibration</u>	
The Council accepts this can be scoped out of the ES subject to best practice being adhered to and the matters considered as part of the planning application (i.e. careful siting of noise generating equipment away from receptors)	Noise Impact Assessment, submitted as part of the planning application
<u>Ground Conditions and Contaminated Land</u>	
The impact upon safeguarded minerals does not warrant a chapter within the EIA but a technical report to support the application would aid in addressing relevant planning policy regarding sterilisation	Chapter 9
<u>Daylight, Sunlight & Overshadowing</u>	
The Council accepts this can be scoped out of the ES but as set out in Section 9.11 of the Scoping Report, a Glint and Glare Assessment should be submitted	Appendix I.6
<u>Agricultural Land</u>	
The Council accepts the matter can be scoped out of the ES, but that it needs considered as part of the planning application, which will need to be accompanied by an Agricultural Land Classification Report. Concept restoration and aftercare schemes should also be provided	Appendix I.2
<u>Major Accidents and Disasters</u>	
The Council noted there is a fire risk associated with certain battery types and therefore considers this risk should be scoped into the ES	Appendix I.3
Lead Local Flood Authority (LLFA)	
The Flood Consequence Assessment should outline the potential flood risk to the Site, the impact of the Proposed Development on flood risk	Appendix B.1



Issue Raised in the EIA Scoping Process from Statutory Consultees	ES Chapter addressed
elsewhere and the measures proposed to be incorporated to mitigate this risk in accordance with TAN15	
The Surface Water Drainage Strategy must demonstrate the system is compliant with the Welsh Government 'Statutory Standards for Sustainable Drainage Systems' and relevant legislation	Appendix B.3
Water Framework Directive (WFD) Assessment should demonstrate the impact the Proposed Development would have on nearby and linked waterbodies and assess the effect on groundwater catchments. The WFD Assessment should also provide a detailed assessment of the impact of the Proposed Development on hydro morphological, biological and chemical status of the associated waterbodies	Appendix B.2
The Applicant is to provide a detailed assessment of the baseline and future baseline conditions with respect to flood risk and surface water drainage	Chapter 6.5
The Applicant is to provide an assessment of the impacts of construction, operation and decommissioning on any receptors identified in the baseline conditions	Chapter 6.7
Details of mitigation measures are required to limit the risks identified during the construction, operation and decommissioning phases of the Proposed Development	Chapter 6.6 and Chapter 14
Conwy County Borough Council (CCBC)	
CCBC stated in the absence of any indication of the extent and location of landscaping, it is impossible to ascertain the degree of mitigation. Furthermore, the ground and microclimate conditions in the area present challenging conditions for the establishment of new planting and this can impact timescales over which meaningful results can be achieved	Outline Landscape and Ecology Management Plan (oLEMP) submitted as part of the planning application
CCBC expect detailing planting specifications to be included in the planning application, and for the LVIA to make a realistic assessment of the success of landscaping in mitigating impacts	Chapter 11 and oLEMP submitted as part of the planning application
Internal consultees have drawn a need for heritage impact to be scoped into the ES and standalone reports on drainage, noise, glint and glare as well as minerals	Chapter 12, Appendix B.1 , standalone report submitted as part of the planning application, Appendix I.6 and Appendix E.2
Natural Resources Wales (NRW)	
<u>Biodiversity</u>	
The ES must identify protected species within and in the vicinity of the Proposed Development, as well as a detailed assessment on the likely significant impacts	Chapter 10.5 and 10.7
NRW advise the ES considered significance alone and in combination, as well as conservation status. In respect of conservation status, we advise consideration to be given to current conservation status (CCS), and demonstration of no likely detriment to maintenance of favourable conservation status during construction operation and decommissioning phases of the scheme	Chapter 10.10
Any habitat surveys should accord with the NCC Phase 1 survey guidelines and advise these are undertaken during summer to ensure the best chance of identifying habitats present	Chapter 10.4
NRW advise that Habitats Directive Annex 1 habitats are identified as part of this assessment	Chapter 10.4 - Assessment
NRW advises the Site is subject to assessment to determine the likelihood of protected species and targeted species surveys are	Chapter 10.4 - Assessment



Issue Raised in the EIA Scoping Process from Statutory Consultees	ES Chapter addressed
undertaken for all species scoped in. These are to comply with current best practice guidelines.	
It should be noted that St Asaph Business Park is considered to support a nationally important population of great crested newts (GCN) that has an unfavourable conservation status	Chapter 10
Should protected species be found during the surveys, information must be provided identifying the species-specific impacts in the short, medium, and long term together with any mitigation and compensation measures proposed to offset the impacts identified	Chapter 10.7 and 10.8
Long-term security of any mitigation or compensation should be set out, including management and monitoring information, long term financial, tenure and management responsibility	Chapter 10.11
Where potential significant impacts are identified on protected species, NRW advise a Conservation Plan is prepared	Chapter 10
Where a European Protected Species is identified and the development proposal is predicted to likely contravene the legal protection they are afforded, a licence should be sought from NRW	Chapter 10.7 - Species
NRW recommends the developer consults the local authority ecologists on the scope of work, as well as other relevant organisations or personnel	Chapter 10.3
We advise that provisions of the EIA audit compliance is provided in respect of relevant nature conservation legislation (UK and Wales) together with relevant local and national policies including BS 42020:2013	Chapter 10
Breeding bird surveys should be in line with industry best practice	Table 10.3
The habitat on Site looks suitable to support barn owl and therefore suggest the impact on barn owls should be considered within the Scheme	Chapter 10.7 - Species
Determining the importance of species and populations identified from surveys should refer to Wales specific resources and publications	Chapter 10.4 - Assessment
Details of appropriate mitigation (following the step-wise approach) for any likely significant effects identified should be provided along with appropriate enhancements	Chapter 10.6 and 10.8, Green Infrastructure Statement which will be submitted as a standalone report alongside the planning application
We advise there may be a potential link between bat sites within the surrounding areas and the hibernating bats found at Coedydd ac Ogofau Elwy a Meirchion Site of Special Scientific Interest (SSSI) / Coedwigoedd Dyffryn Elwy Special Areas of Conservation (SAC). This should be assessed to determine if there is a link and a potential impact	Chapter 10.7 - National Statutory Designated Sites Coedydd ac Ogofau Elwy a Meirchion SSSI
There is the potential for pollutants and sediment from the construction phase to enter these watercourses, which are hydrologically linked to the Clwyd catchment. A Construction Environmental Management Plan (CEMP) should be produced to ensure adequate measures are in place to minimise risk of pollution and contamination	Appendix A.5
Landscape and Visual Impact	
Plans should be provided to establish clarity on the baseline and potential for cumulative effects from the previous consent and existing operational site adjacent to the Proposed Development	Appendix G.1
We advise that Guidance Note 46 Using LANDMAP in Landscape and Visual Impact Assessments (GN46 NRW) should be used together with site-based experience of likely impacts on the protected landscapes to clarify appropriate search and study areas	Chapter 11.2



Issue Raised in the EIA Scoping Process from Statutory Consultees	ES Chapter addressed
The previously referenced adjacent development (Scoping Report 2.1.3 Conwy LPA ref. 0/40999) included a 10 km Zone of Theoretical Viability (ZTV) analysis indicating visibility of long views possible from the Clwydian Ranges. As this proposal is for a larger scheme with potential for even greater cumulative effects across both sites it is unclear why a reduced range for the ZTV is proposed for this scheme	Table 11.5
Suggest deployment of an asymmetrical study area as described in Guidance note 46 may be appropriate to include long views from elevated aspects of the Clwydian Range	Appendix G.2
We advise the LVIA should refer to further evidence on these qualities and how they are affected by the development. We refer the applicant to Supplementary Planning Guidance Note Clwydian Range and Dee Valley AONB, June 2018	Chapter 11.2
We would recommend the identification of additional viewpoints from the Offa's Dyke named route within the National Landscape east of the site and from elevated viewpoints within the National Landscape such as at the Moel Hirradug Hillfort (265 m AOD) to ensure representative views and visual amenity of the National Landscape	Appendix G.1
LANDMAP visual and sensory aspect area evaluations should be provided at all viewpoints inside and within the immediate setting of the Clwydian Range and Dee Valley National Landscape Visualisations should be provided. These inform both assessment of effects on visual receptors (people) but also effects on the character of the landscape: an environmental resource in its own right	Appendix G.3
The Glint and Glare Assessment should apply appropriate modelling and predictive techniques, charts/ diagrams and visual representations to indicate the likely extent and distance of potential glint and glare and should be informed by panel heights, directionality, design/type, location/extent and identification of sensitive receptors with their proposed mitigation	Appendix I.6
The cumulative effects along with other proposals proceeding will need to be understood to ascertain potential harms and necessary mitigations and therefore we advise this is also scoped in	Chapter 11.9
Flood Risk and Water Resources	
We advise flood risk should be scoped into the ES	Chapter 6
Any application for a new solar farm at this location will need to be supported by a Flood Consequences Assessment (FCA). The FCA should be appropriately detailed in order to advise further on likely significant effects including increased risk elsewhere, impact on flood risk assets and receptors.	Appendix B.1
The Site should be designed to be flood free during the 0.5% annual exceedance probability (AEP) tidal (breach) flood event and /or the 1% AEP fluvial event. If it is not feasible for the Site to be designed to be flood free, the solar panel edges must be raised above flood levels (preferably 300 mm above the design flood level). Any buildings or essential infrastructure must be designed to be flood free for the design event.	Section 4.3.13
The ES will need to consider impacts of tidal breach and implications of SMP2 policy unit changes, in addition to sea level rise from the Clwyd. We advise it would also be helpful to provide clarifications on the red line boundary and various site areas	Chapter 6
We advise that matters relating to cableway route watercourse crossings should be scoped into the ES with further information provided about the watercourses involved and mitigation to prevent changes to the flow of water	Chapter 6.6
We would advise that horizontal direct drilling or other forms of undergrounding are used wherever possible. Detailed information on the proposed methodology, along with evidence to demonstrate that there will not be impacts on fluvial geomorphology, should be provided	Chapter 6.6 and Appendix B.2



Issue Raised in the EIA Scoping Process from Statutory Consultees	ES Chapter addressed
within the ES. We advise that this information is also set out in a WFD Compliance Assessment	Further detail to be provided in the CEMP at a later stage
We advise that the use of culverts is avoided. For access purposes, bridges should be used wherever possible in order to maintain the natural flow, allow natural channel migration and to maintain natural sediment and gravel movement downstream	Appendix A.5
Ground Conditions and Contaminated Land	
We advise ground conditions should be scoped into the ES for the Clwyd Limestone Principal Aquifer at the western area of the cable run and for all of the cable run as this will involve more substantial groundworks to bury the cable	Chapter 9
We advise the proposed CEMP should include a specific section on the protection of groundwater from pollution during the construction phase	Appendix A.5
We advise that all materials to be used in construction of the project be assessed for their long-term resilience and environmental safety which includes assessing for the various contaminants of emerging concern	Appendix A.5
We generally agree with the statement that “BGS data demonstrates that the aquifer designation matches the bedrock, with the areas of sandstone bedrock being classified as a ‘Highly Productive Aquifer’, with the mudstone, siltstone and sandstone as well as the limestone being a ‘Moderately Productive Aquifer’”, however, we advise limestone should be considered most vulnerable	Table 9.12
We advise that the potential contamination of soils and controlled waters during the construction phase is of more concern and should be addressed in the CEMP	Appendix A.5
Major Accidents and Disasters	
We advise that BESS storage and fires/run-off associated with fire-suppression water, matter should be scoped in, and the mitigation measures clearly set out in the ES	Appendix I.3 and Chapter 6.6
The BESS elements of this proposal should be constructed in a way that, <i>should</i> there be a fire on site, that the run-off associated with the fighting of this fire is contained and does not enter the wider environment. This should be outlined along with drainage and emergency plans in the Outline Battery Safety Management Plan (OBSMP)	Appendix I.3 and Chapter 6.6
The ES should ensure the proposal is able to demonstrate the ability to contain fire water and/or that off-site transport can be demonstrated to be feasible in consultation with other consultees such as the fire and rescue services	Appendix I.3 , Chapter 6.6 and Chapter 7.5
We advise that measures to minimise the risk of pollution from contaminated firewater should be clearly set out by the applicant in a detailed drainage scheme	Chapter 6.6
Water Framework Directive	
Note, any deterioration in class would not be compliant with the WFD Regulations 2017	Chapter 6.7
Cadw	
Based on the fact that additional desk-based research and geophysical surveys are currently being undertaken, suggesting the results of the initial assessment indicate archaeological sites, Cadw strongly suggest Archaeology is scoped into the ES	Chapter 7
Cadw disagrees with the search area of 2 km, and recommends this is extended to 5 km in line with that of the Landscape and Visual Impacts	Chapter 12.4 – Study Area
It is expected that the impact of the Proposed Development on the setting of the designated historic assets be considered in accordance with the guidance given in “The Setting of Historic Assets in Wales”, which requires a stage 1 assessment for all designated historic assets	Chapter 12.2 – Relevant Guidance



Issue Raised in the EIA Scoping Process from Statutory Consultees	ES Chapter addressed
to determine the need for any stages 2-4 assessments to be carried out	
CADW raises concern about the impact of the Proposed solar farm on the setting of the statutorily registered Kinmel Park historic park and garden as the Solar Farm Site adjoins part of the registered area and is also in the identified significant views from the park	Chapter 12.7 – Kinmel Park
The BESS Site is located within 5 km of the register The Vale of Clwyd and Lower Elwy Valley historic landscapes and the impact of the BESS Site on this therefore needs to be considered in the EIA. CADW adds that this impact should be assessed using the methodology in 'The Setting of Historic Assets in Wales' and that an ASIDOHL assessment is not required.	Chapter 12
Soil Policy & Agricultural Land Use Planning Unit	
<u>Agricultural Land Classification</u>	
As BMW land has been identified in the Predictive ALC Map, as per published Departmental Guidance, a detailed ALC survey is required to confirm the grades and their distribution	Appendix I.2
<u>Baseline Information</u>	
The location and extent of soils on site and their physical characteristics would be beneficial to assess potential impacts and inform decisions on infrastructure siting and decommissioning, restoration and beneficial after use of the site. The volumes of soil units that will be excavated for any on site infrastructure should be clear and based on survey evidence. The majority of information may be derived from the ALC survey information for the sites.	Appendix I.5
<u>Infrastructure and potential impacts on soil functions</u>	
The type, location and level of infrastructure proposed as part of the development will need to be fully detailed for the assessment. The Assessment should include detailed information on the total number and spacing of piles installed; the extent of cable trenching and if any imported fill materials used (e.g. cement bound sand), track extent type and location, inverter pads number and locations and areas for construction compounds, etc	A Detailed CEMP and DEMP are to be secured via a suitable worded planning condition
The assessment will need to provide detailed information on the methodology for the installation and decommissioning of the infrastructure and, considering the soils on site, how any likely impacts have been assessed and avoided.	Appendix A.5 and A.6 A Detailed CEMP and DEMP are to be secured via a suitable worded planning condition
<u>Soil Management Plan</u>	
The soils described on Site, combined with the climatic regime put the soils at a high risk of damage if inappropriately managed. It welcomes the Soil Management Plan, which should be informed by the baseline ALC report and soil resources and characteristics.	Appendix I.5
The Soil Management Plan should include a soil stripping programme, soil handling techniques and procedures, size, location, construction, management and period of soil storage dumps as well as proposed after use and restoration programme including the techniques and aftercare programme	Appendix I.5
Department for Economy and Infrastructure	
Solar panels should be positioned and shielded as to not cause any significant glint and glare to the users of the A55 trunk road	Appendix I.6
Details on the Risk Assessments and Method Statements (RAMS) for the cable crossing of the A55 should be provided to the Welsh Government as details emerge. It will not be accepted for any method of construction which included the excavation of the existing A55 pavement layers	To be secured via a suitably worded planning condition



Issue Raised in the EIA Scoping Process from Statutory Consultees	ES Chapter addressed
Environmental Public Health Service Wales	
The planning application should be supported by an assessment of the potential impacts arising from electro-magnetic radiation, any fire at the battery energy storage system and the construction of the Proposed Development	Appendix I.4 , Appendix I.3 and Appendix A.5
North Wales Fire and Rescue Service	
Battery Safety Management Plan to include provision of an adequate water supply, fire appliance assessment and the provision for the containment of contaminated fire water run-off	Appendix I.3
SP Energy Networks (SPEN)	
SPEN requires reference in any baseline studies to SP Manweb (SPM) network and assessment of the impact of the Proposed Development on this network	Section 3.5.32 – 3.5.35
A draft CEMP is to be prepared and contain details on utilities and explain how impact on the electricity network is to be managed and mitigated. SPEN required adequate space to maintain and operate its network and numerous land right interests across the proposed site must be maintained and managed to ensure the network is safe and reliable. These rights should be included in protective provisions within suitably worded agreements between SPM and the Applicant	Appendix A.5

2.5 Consultation

2.5.0 In addition to consultation to agree the scope of the EIA, consultation with relevant statutory and non-statutory bodies has been undertaken throughout the EIA and design process. Within each technical chapter of this ES, there is further detail on any topic specific consultation that has been undertaken, such as to agree the detailed scope of the assessment, to provide information, to discuss assessment methods and findings, and / or agree mitigation measures and design responses.

2.6 Assessment Assumptions

2.6.0 The following assumptions have been used to provide a robust assessment of likely significant effects of the Proposed Development in the EIA:

- Assessments assume the baseline conditions at the time of ES preparation (2024/2025);
- Baseline conditions have been established through site surveys and desk-based assessment of the current conditions onsite;
- It is assumed that current surrounding land uses will not change, with the exception of the cumulative schemes identified;
- Assessments are based on published sources of information and primary data collections. Sources are provided as necessary;
- Assessments conclude the worst-case effect that would arise from the Proposed Development;
- Suitable planning conditions or planning obligations (if required) will be imposed as identified in this ES to secure appropriate mitigation measures;
- The Proposed Development will be constructed broadly in accordance with the phasing, programme and construction practices documented in **Chapter 5**;



- The Proposed Development will be delivered in accordance with the Planning Drawings (shown in **Appendix A.9**); and
- The assessment of likely significant cumulative effects has assumed that the approved and/or existing developments identified in **Appendix A.8** will be built out as set out in the documents supporting those applications.

2.7 Uncertainty and Limitations

- 2.7.0 The studies undertaken within the ES have been progressed in a transparent, impartial and unbiased way with equal weight attached, as appropriate, to beneficial and adverse effects. Where possible, this has been based upon quantitative and accepted criteria together with the use of value judgements and expert interpretations.
- 2.7.1 The prediction of future effects inevitably involves a degree of uncertainty. Where necessary, the technical chapters describe the principal factors giving rise to uncertainty in the prediction of likely environmental effects and the degree of the uncertainty.
- 2.7.2 Confidence in the predictions has been achieved by employing accepted assessment methodologies, e.g. Guidelines for Ecological Impact Assessment in the UK. Uncertainty inherent within the prediction has been described. The ES has sought to provide a robust assessment of the likely significant effects of the Proposed Development.
- 2.7.3 Further limitations in preparing this ES are noted in each of the technical chapters, as appropriate in **Section X.4** of each chapter.

2.8 Assessing Effects

Establishing Baseline Conditions

- 2.8.0 A range of Site surveys and data collection exercises have been used to identify environmental conditions at the Site and in the surrounding area to provide a basis for the subsequent assessment work. This has included, for example, site visits, ecological surveys, soil surveys and geophysical surveys. The surveys and data collection activities undertaken to support the assessments are reported in each of the technical chapters.
- 2.8.1 It should be noted however that some of the technical surveys and assessments on which the EIA is based are too detailed and lengthy for incorporation into Volume 1 of this ES (e.g. ecology survey reports). In such instances, the technical survey and assessment reports are provided in full as an appendix to this ES (Volume 2), with a relevant summary and the reference for the full survey or assessment provided in the ES. The geographical scope of these appended surveys and assessments has been based on the likelihood for significant effects.
- 2.8.2 The EIA has assessed the likely significant effects of the Proposed Development against baseline conditions in the same year (i.e. providing an assessment of 'do something' and 'do nothing'). As required by the EIA Regulations, each chapter has also considered as appropriate the likely evolution of current baseline conditions without implementation of the Proposed Development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of available environmental information and scientific knowledge. The EIA has therefore used these future baseline conditions within the assessment of effects.

Assessing Construction Effects

- 2.8.3 The EIA has assessed the likely environmental effects that could occur during construction. Given that a principal contractor has not yet been appointed it is not possible to be definitive about the construction works. Therefore, the assessment of likely environmental effects during



the construction phases has been based on available information and reasoned judgements based on professional experience to enable the likely environmental effects to be identified.

- 2.8.4 Construction effects will be temporary and intermittent, i.e. works will not occur in one location throughout the entire duration of the construction works. The potential duration and intermittency of effects is identified as appropriate in **Chapters 6-12** based on the information provided in **Chapter 5**.
- 2.8.5 In judging the significance of construction effects, it has been assumed that a CEMP, secured via a suitably worded planning condition, will adequately address mitigation measures in relation to construction effects identified within **Chapters 6-12**, the principles of which are set out in the submitted oCEMP submitted with this application in **Appendix A.5**.

Assessing Operational Effects

- 2.8.6 The EIA has focused on assessing the likely environmental effects of the Proposed Development. This approach considers the environmental effects of the full planning application.

Assessing Decommissioning Effects

- 2.8.7 The EIA has assessed the likely environmental effects that could occur during decommissioning. Typically, decommissioning phase effects are similar in nature to the construction phase, although they may be of shorter duration and of less intensity. Similar to the construction phase effects, the assessment assumes the implementation of standard good practice measures and focus on the Proposed Development specific effects arising from decommissioning.

2.9 Mitigation and Enhancement

- 2.9.0 The incorporation of mitigation measures, which are measures to avoid minimise or compensate for adverse effects, is an integral part of the design and EIA processes. The embedded mitigation for the Site is set out in **Section x.6** and within each topic chapter.
- 2.9.1 The EIA Regulations require an ES to contain: *“A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment”*.
- 2.9.2 In accordance with 2024 IEMA Mitigation in EIA Guidance⁷ mitigation is defined as follows:
- **Primary mitigation** (also known as embedded mitigation): *“Modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project, and do not require additional action to be taken.”*
 - Primary mitigation example: avoiding a key habitat or archaeological feature through the development’s layout and operation.
 - **Secondary mitigation:** *“Actions that will require further activity in order to achieve the anticipated outcome. These may be imposed as part of the planning consent.”*
 - Secondary mitigation example: Installing bird or bat boxes, or creating wildflower margins, subject to post-consent ecological management plans.
 - **Tertiary mitigation:** *“Actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other*

⁷ IEMA Guidance: Implementing the Mitigation Hierarchy from Concept to Construction



existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects."

- Tertiary mitigation example: activities within an oCEMP.

- 2.9.3 As part of the design process suitable mitigation measures were incorporated into the Proposed Development to mitigate potentially significant environmental effects. This primary mitigation or "embedded mitigation" and has been considered within each of the topic chapters in this ES.
- 2.9.4 Measures to enhance the current Site have also been included within the design of the Proposed Development such as habitat creation and delivering a net gain for biodiversity.
- 2.9.5 Further secondary mitigation measures and opportunities for environmental enhancement have also been identified through the EIA process. Such mitigation and enhancement measures are identified in this ES along with how it is proposed that they be secured.
- 2.9.6 A hierarchy of methods for mitigating significant adverse effects in EIA terms will be followed; these are, in order of preference:
- **Avoidance** – designing a development in such a way that avoids effects on the environment (e.g. avoiding siting specific infrastructure in areas that could be affected by flood risk)
 - **Reduction** – design the Proposed Development or employ construction methodologies such that significant effects identified are reduced (e.g. employment of sustainable drainage to mitigate the effects of development on surface water run-off)
 - **Compensation** – providing off-site enhancement in order to compensate for where onsite mitigation has not been possible (e.g. financial contributions towards local infrastructure).
 - **Enhancement** - opportunities that the Proposed Development may provide to enhance the local and wider environment.
- 2.9.7 Where the effectiveness of the mitigation proposed has been considered uncertain, or where it depends upon assumptions of operating procedures, data and / or professional judgement has been introduced to support these assumptions.
- 2.9.8 Mitigation recommended during the construction phase would be set out in the CEMP to be agreed with DCC and CCBC prior to the commencement of work and implemented throughout the duration of the works. An oCEMP is included in **Appendix A.5**.
- 2.9.9 Mitigation to be implemented during the operational phase would be secured through planning conditions and obligations.
- 2.9.10 Environmental effects remaining after mitigation measures have been incorporated are termed "residual effects" and these are fully described in the ES.

2.10 Assessment of Cumulative Effects

- 2.10.0 The EIA Regulations require the assessment to consider the likely significant effects of the Proposed Development in the context of other existing and / or approved projects, as well as the cumulative effects that may result from the Development and these other developments.
- 2.10.1 'Approved developments' are considered to be planning permissions that are partially built out and extant planning permissions. Planning applications that have been submitted but not yet determined have also been considered where there is a likelihood that the application may be granted planning permission before this application is determined.



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- 2.10.2 A review of 'approved developments' was undertaken to identify major developments within the boundary of DCC and CCBC that may lead to likely significant cumulative effects with the Proposed Development. It was considered that significant cumulative effects are unlikely with developments outside of these areas.
- 2.10.3 An initial review of approved/existing development was undertaken, and confirmation of approval sought from DCC and CCBC. The initial review identified 2 developments to be included in the cumulative assessment. The full methodology for approved developments, the schedule of approved developments and a plan showing their location, is provided in **Appendix A.8**.

2.11 Impact Interactions

- 2.11.0 **Chapter 14** provides the assessment of impact interactions, i.e. receptors being affected by more than one environmental effect and therefore potentially being subject to a more significant combined effect than the individual effects reported in each of the topic chapters.
- 2.11.1 The approach adopted for the assessment is in accordance with the methodology set out above, with further details provided in **Chapter 14**.
- 2.11.2 **Chapter 14** therefore provides an overall summary of the effects of the Proposed Development during construction and operation.

2.12 Significance Criteria

- 2.12.0 The EIA Regulations stipulate that an ES should identify, describe and report the likely significant effects of a development on the environment. Therefore, this ES identifies and reports the likely significant effects of the Proposed Development in relation to the proposed construction, operational and decommissioning phases. Environmental effects have been evaluated with reference to definitive standards and legislation where available. Where it has not been possible to quantify effects, qualitative assessments have been carried out, based on available knowledge, guidance, and professional judgement. As noted previously, where uncertainty exists, this has been noted in the technical assessment.
- 2.12.1 The two principal criteria for determining significance of an environmental effect are the magnitude of the effect and the sensitivity of the receptor, in addition the likelihood of the effect occurring is also considered as appropriate.
- 2.12.2 The approach to assessing and assigning significance to an environmental effect has relied upon such factors as consideration of the EIA Regulations, guidelines, standards or codes of practice, the advice and views of statutory consultees and other interested parties, and professional judgement.
- 2.12.3 The following questions are relevant in evaluating the significance of likely environmental effects:
- Is the effect direct, indirect or cumulative?
 - Does the effect occur over the short, medium or long term?
 - Is the effect permanent or temporary?
 - Is it positive, neutral or adverse effect?
 - Is the effect reversible or irreversible?
 - Does the effect increase or decrease with time?
 - Is the effect of local, regional, national or international importance?



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- Are health standards or environmental objectives threatened?
- Are mitigating measures available and is it reasonable to require these?

2.12.4 Specific significance criteria have been prepared for each specialist topic, based on the generic criteria, for adverse and beneficial effects, set out in **Table 2.2**.

Table 2.2: Generic Significance Criteria

Significance Level	Criteria
Severe	Only adverse effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of international, national or regional importance. A change at a regional or district scale site or feature may also enter this category.
Major	These effects are likely to be important considerations at a local or district scale but, if adverse, are potential concerns to the project and may become key factors in the decision-making process.
Moderate	These effects, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process.
Not Significant	No effect or effect which is negligible or beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.

2.12.5 The assessments reported in the ES, including judgements on significance, have been used within the Planning Statement to inform the planning balance for the application. A severe or major adverse does not, in itself, indicate that an application should be refused, just as a severe or major beneficial effect does not indicate that an application should be approved.

2.13 Monitoring

2.13.0 The EIA Regulations introduce the requirement for the monitoring of significant adverse environmental effects where appropriate and that a schedule of proposed monitoring should be set out in an ES.

2.13.1 Each chapter of the ES therefore identifies the proposed monitoring arrangements for that topic. As stated in the EIA Regulations effort should be made to ensure that *“the type of parameters to be monitored and the duration of the monitoring are proportionate to the nature, location and size of the proposed development and the significance of its effects on the environment.”*

2.13.2 A summary of mitigation and monitoring requirements identified in each topic chapter is provided in **Chapter 15**.



3 Site and Development Description

3.0 Overview

- 3.0.0 This Chapter outlines the key environmental characteristics of the Site, the surrounding area and a description of the Proposed Development for which full planning permission is sought. Details of the characteristics and sensitivities of the individual receptors which have been identified within relevant Study Areas and used to assess likely environmental effects from the Proposed Development, are then provided in each chapter of the technical assessments presented in **Chapters 6-12**.

3.1 The Site

- 3.1.0 The Site is delineated by the red line boundary in the Site Location Plan (**Appendix A.1**) and includes the Solar Site, BESS Site and Cable Corridor. The total site area within the red line boundary is approximately 183.77 hectares (ha).

Solar Site

- 3.1.1 The larger parcel of land to the northwest of Bodelwyddan extends to approximately 168.95 ha, comprising land to the north and south of Rhuddlan Road (A547), and to the west of St Asaph Avenue, and hereinafter is referred to as the 'Solar Site'. The Solar Site is split up into six parcels of land, as per the Proposed Solar Site Layout (**Appendix A.9**). Towyn and Kimmel Bay are located to the north of the Solar Site and Abergele to the west.
- 3.1.2 A 2015 consent (Conwy LPA ref. 0/40999) authorised the development of a 24MW solar farm and part of this development area overlaps with the Solar Site. However, the part which overlaps was never developed as only part of the proposal authorised by this consent was built out. This solar scheme neighbours the Solar Site as can be seen in **Appendix A.9**. The precedent for solar development in this area has been established by this permission.

BESS Site

- 3.1.3 The smaller, circa 6.52 ha, rectangular parcel of land is positioned south of St Asaph Business Park and to the west of Bodelwyddan substation. It is referred to as the 'BESS Site' in this EIA. High voltage overhead lines transect the eastern part of the BESS Site and pylons are located to the east and south of the site (which are proposed by National Grid to be re-aligned in the future). To the east, south and west of the BESS Site lies agricultural land.

Cable Corridor

- 3.1.4 The Cable Corridor links the various parcels together within the Solar Site and then connects the Solar Site with the BESS Site and subsequently to the Point of Connection (PoC) at Bodelwyddan Substation. The Cable Corridor is approximately 10m wide and the area within the Cable Corridor red line boundary measures approximately 8.29ha.

3.2 Environmental Baseline Conditions

Landscape

- 3.2.0 The Site lies outside of Green Wedges, Country Parks, National Parks and any National Landscapes (previously Area of Outstanding National Beauty).
- 3.2.1 Two Registered Landscapes of Outstanding Historic Interest are located to the south and south-east, c.1 km and c.4 km from the Site respectively. Both are considered highly sensitive landscape receptors and have been scoped in for further consideration. There is a relatively infrequent network of Open Access Land (OAL) and Public Rights of Way (PRoW) such as



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footpaths, bridleways, byways open to all traffic, cycle routes, promoted paths and national trails in proximity to the Site.

3.2.2 The North Pilgrims Way is the closest promoted route to the Site, around 1 km south-east. Offa's Dyke (c. 6 km east) and the Wales Coastal Path (<2 km north) are also within the study area. National Cycle Routes 84 and 5 are located approximately <2 km east and north, respectively.

3.2.3 There are no areas of OAL or PRoW within the boundaries of the Site. One PRoW runs adjacent to the Site boundary of the Solar Site, whilst a few are in proximity and have the potential for intervisibility with the Site. Views from all PRoW and OAL within that have the Study Area potential for intervisibility with the Site. There are five Ancient Woodlands within proximity to the Site:

- **37492** - Restored Ancient Woodland Site (adjacent southern border of Solar Site);
- **37493** – 280 m to north of border;
- **37491** – 356 m to south of border;
- **37489** – 457 m to southwest of border; and
- **37412** – 680 m to east of border.

Flood Risk and Drainage

3.2.4 The Solar Site falls almost entirely within the Development Advice Map (DAM) zone C1, meaning it is an area of floodplain that benefits from the presence of flood defences.

3.2.5 The BESS Site is located in DAM zone A, therefore at little or no risk of flooding from main rivers or the sea.

3.2.6 The Solar Site parcels that are located to the south of the A547 fall within an areas of 'Low' risk of flooding rivers, meaning they are at risk from a present day 1 in 1,000 year defended event. Of the parcels to the north of the A547, only part of the westernmost parcel falls within an area of 'Low' risk.

3.2.7 Regarding tidal flooding, almost all of the Solar Site is at predicted risk during a present day 'Low' risk event, meaning it is potentially at risk during a 1 in 1,000-year event even with current defences in place. The predicted extent of this event is very similar to that of the DAM zone C1.

3.2.8 According to NRW's Surface Water and Small Watercourses flood map, significant parts of the parcels south of the A547 are predicted to be inundated during a low-risk event, during a 1 in 1,000-year event. North of the A547 the extents are smaller. It should be noted that due to its strategic scale, this mapping often misrepresents smaller watercourses as well as control structures, culverts, crossings, sluices or pumps. Therefore, it is likely that the risk of surface water and fluvial flooding posed to the Site is better represented by the above flood modelling studies.

3.2.9 Only very small parts of the BESS Site fall within areas predicted to be at risk from surface water and small watercourses. The majority of these are likely to be associated with field perimeter ditches, which may not be fully represented by the simulation modelling. The remaining areas are minor depressions in the land so depths would not be significant.

Biodiversity

3.2.10 The Site is not covered by any international or national conservation, ecological or heritage designations.



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- 3.2.11 The Cable Corridor passes through Coed Parc Kinmel (Candidate) Wildlife Site, designated for its coniferous woodland, which is considered to be of County ecological importance.
- 3.2.12 Traerth Pensarn SSSI and Liverpool Bay / Bae Lerpwl Special Protection Area (SPA) lie approximately 3,100 m to the northeast and 2,100 m to the north of the Solar Site respectively.
- 3.2.13 There are 31 Wildlife Sites and one Local Nature Reserve present within 2 km of the Solar Site including two within the Site boundary, and there are 11 Wildlife Sites within 2 km of the BESS Site.
- 3.2.14 An Arboricultural Impact Assessment by EPD submitted with the planning application, this identified 232 individual trees, 51 groups of trees, 190 hedgerows and 19 woodlands, totalling 492 items. Of these 492 items, 84 have been categorised as A, of high quality, 90 have been categorised as B, of moderate quality; and 276 have been categorised as C and are of low quality. In addition, 42 items have been categorised as U and are considered unsuitable for retention.

Agricultural Land

- 3.2.15 The Agricultural Land Classification (ALC) predictive map for Wales indicates that the Site is predominantly Grade 3b, with some small areas of Grade 3a along the southern boundary (of the Solar Site). An Agricultural Land Classification Survey has been carried out in accordance with the MAFF, (1988). *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land* methodology to test this position and plot it accurately. The methodology determines grade based on the long-term, physical limitations of land for agricultural use, such as climate, site and soil, and the interactions between these factors. The survey found that approximately 89% (148 ha) of the Solar Site was Grade 3b land, with 6.8% (11.3 ha) Grade 3a (Best and Most Valuable (BMV)). The entirety of the BESS Site, at 6.5 ha, is Grade 3b land (0% BMV). The survey was validated by LQAS on 29th July 2025.

Cultural Heritage and Archaeology

- 3.2.16 There are no designated historic assets within the Solar Site or the BESS Site. The Cable Corridor (which is entirely underground) partly extends through Kinmel Grade II* Registered Historic Park and Garden (RHPG), the boundary of the access drive (Coed y Drive) lies immediately east and west of the Solar Site, and which is adjacent to the southern boundary of the existing operational solar farm. The southern extent of the Cable Corridor Route lies along the southern boundary of Bodelwyddan Castle Grade II RHPG.
- 3.2.17 Five Scheduled Monuments are located within the 2 km Study Area:
- St George's Well, c. 330 m south of the Site;
 - First World War Practice Trenches at Bodelwyddan Park, c. 450 m north of the Site;
 - Tyddyn Bleiddyn Burial Chamber, c. 980 m south of the Site;
 - Bedd-y-Cawr Hillfort, c. 1.1 km south of the Site; and
 - The Mount, c. 1.6 km west of the Site.
- 3.2.18 A total of 163 Listed Buildings are located within the Study Area, of which two are Grade I Listed, 23 are Grade II* Listed and 138 are Grade II Listed. Several of these, including the Grade I Kinmel and Grade I Llwyni are located within Kinmel and Bodelwyddan RHPGs.
- 3.2.19 The nearest Listed Buildings to the Site are:
- Grade II* Morfa Lodge, 70 m east and west of the Solar Site;



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- Grade II Listed Toll Bar Cottage, c. 30 m south of the Solar Site;
 - Grade II Listed Bodoryn Cottages, c. 20 m south of the Solar Site; and
 - Grade II Kinmel Park, gatepiers and railings, immediately south-west of the Indicative Cable Route.
- 3.2.20 Three Conservation Areas are situated within the Study Area: St George, c. 120 m south of the Cable Corridor part of the Site; Bodelwyddan, 1.3 km to the south of the Site; and Abergele, 1.8 km to the west of the Site.
- 3.2.21 The Vale of Clwyd Registered Historic Landscape lies c. 800 m south of the BESS Site.
- 3.2.22 Further details of built heritage designations within the surrounding area are detailed within **Chapter 12**.

Ground Conditions

- 3.2.23 The Site is currently used as agricultural land, and is both currently and historically undeveloped therefore, the potential for contamination to be present in the ground is very low.

3.3 The Proposed Development

- 3.3.0 In accordance with the EIA Regulations, this Chapter sets out a description of the physical and operational characteristics of the Proposed Development for which planning permission is being sought.

- 3.3.1 The description of the Proposed Development is:

“Construction, operation and decommissioning of a proposed solar photovoltaic (PV) electricity generating system and battery energy storage system (BESS), associated solar arrays, inverters, transformers, substations and ancillary buildings, accesses, internal access tracks, landscaping and biodiversity, fencing/CCTV, cabling and associated ancillary development”

- 3.3.2 The Proposed Development will have an operational lifespan of 40 years, after which it will be fully decommissioned, and this would be secured via a planning condition.

- 3.3.3 The Proposed Development includes the following key elements of infrastructure which are described in more detail in the following sub-sections:

- Solar photovoltaic ('PV') panels and mounting structures;
- Solar inverters and transformers (or 'power conversion units' ('PCU'));
- Switchroom building(s);
- BESS units;
- BESS inverters or PCU;
- Substation, transformer and ancillary buildings;
- Fencing, gates, CCTV and internal access tracks;
- Drainage and water storage tank;
- Access;



- Landscaping and biodiversity enhancements;
- Cables; and
- Associated ancillary development.

Solar PV panels and mounting structures

- 3.3.4 The solar PV panels will convert sunlight / daylight into electrical current. Tracking panels are proposed. The panels are made up of a series of photovoltaic cells beneath a layer of toughened glass.
- 3.3.5 The tracking panels would have a maximum height above ground level of approximately 4.5 m when at greatest inclination and approximately 2.5 m when horizontal, with a minimum height of the lowest part of the panel above ground level at 0.4 m. The solar panels would be aligned in north-south rows. The panels will rotate to the east and west and tilt up to a maximum inclination of 60° from horizontal. Separation distance between rows of tracking panels will be approximately 9.0 m.
- 3.3.6 The mounting would comprise metal frames that hold the panels in rows secured via narrow metal posts driven into the ground to a depth of approximately 1-3 m, dependant on ground conditions. If in the unlikely event that archaeological protection is required, concrete feet or other non-ground penetrative techniques will be considered as an archaeological mitigation option to secure the mounting structures to the ground. Tracker Solar Panel Mounting Structure drawings (Ref 05) are included within the Planning Drawings in **Appendix A.9**.
- 3.3.7 The Proposed Development will utilise solar panels that are confirmed to be free from per- and polyfluoroalkyl substances (PFAS). PFAS are a group of synthetic chemicals known for their persistence in the environment and potential to leach over time due to wear and tear. In response to the scoping direction issued by PEDW, the Applicant confirms that no PFAS-containing materials will be used in the solar panels, thereby eliminating the risk of PFAS leaching into the local environment.

Solar inverters and transformers

- 3.3.8 Inverters convert direct current (DC) generated by the solar PV panels into alternating current (AC). Transformers then convert low voltage output from the inverters to high voltage suitable for feeding into the local electric distribution network.
- 3.3.9 Centralised inverters and transformers are proposed to be within containerised units (similar to shipping containers) located throughout the Solar Site and placed on a concrete base or feet, as shown within the Solar Site Conversion Unit drawing (Ref 06). The maximum dimensions of the units would be approximately 6.1 m by 2.4 m with a maximum height of 2.9 m.

Switchroom building

- 3.3.10 The 33kV sub-distribution switchroom (Ref 06) would accommodate all necessary equipment to enable the power from the conversion units at the Solar Site to be controlled, monitored and metered and connected to the network. The maximum dimensions of the switchroom building would be approximately 12.5 m in length, 3.3 m in width and 3.4 m in height.
- 3.3.11 The substation, inverters and solar panels would be connected by electrical cables either positioned in shallow underground trenches or suspended in trays alongside the arrays.



Battery energy storage systems (BESS), transformer and ancillary buildings

- 3.3.12 The BESS would facilitate efficient management of the energy created and help balance the electricity grid. The BESS would be utilised to reinforce the power generated by the solar farm and other renewable generation assets, storing energy at times of low demand, and releasing to the grid in periods of higher demand or when solar irradiance is lower. The energy stored will also provide balancing services to reinforce grid stability.
- 3.3.13 The BESS will have a capacity of approximately 110MWac with a 4-hour duration and a storage capacity of 440MWh.
- 3.3.14 The BESS units measure approximately 6.1 m in length, 2.4 m in width and 2.9 m in height. The BESS inverters or PCU measure approximately 9.2 m in length, 2.0 m in length and 2.3 m in height and are shown on the BESS Power Conversion Unit drawing (Ref 09)
- 3.3.15 The maximum dimensions of the proposed 400/33kV transformer are approximately 14.0 m in length, 8.0 m in width and 11 m in height, and the PASS unit is approximately 12.0 m in length, 7.3 m in width and 7.6 m in height.
- 3.3.16 The ancillary substation building would measure approximately 29 m in length, 9.5 m in width and 4.0 m in height. The two auxiliary transformer buildings are approximately 10.3 m in length, 7.4 m in width and 4.0 m in height. These are all laid out on the Substation and Aux Transformers Buildings drawings (Ref 11).

Fencing, gates, CCTV and internal access tracks

- 3.3.17 The Proposed Development would be secured to prevent theft and criminal damage and as a health and safety requirement during both the construction, operational and decommissioning phases.
- 3.3.18 At the Solar Site, deer type wire and mesh and wooden post fencing with a maximum height of 2.0 m is proposed around the perimeter, as shown on the Deer Fence and Gate Details plan (Ref 12). The fence is designed to allow sheep to graze securely amongst the arrays. Provision of mammal gaps at ground level in the fencing will allow continued access for foraging of wildlife across the Site. Exact positions of these gaps can be identified in a post-determination detailed Landscape and Ecological Management Plan (LEMP). Gates will be installed to allow for movement from the access points into the Site for ongoing maintenance.
- 3.3.19 At the BESS Site, a metal palisade fence is proposed around the substation / transformer compound of approximately 3.0 m in height as shown on the Security Fence Details plan (Ref 14). A weldmesh fence of approximately 2.5 m in height is proposed at the BESS compound (in the southern part of the BESS Site).
- 3.3.20 The perimeter of the Solar Site and the BESS Site (i.e. the substation and BESS compounds) would be protected by a system of fixed security and monitoring CCTV / infra-red cameras approximately 3 m tall and would be inward facing at intervals along the boundary for security purposes to provide full 24-hour surveillances around the internal perimeter as shown on the Solar and BESS Sites CCTV plan (Ref 15). Cameras would only monitor inside the Sites and not record any public or private land outside the perimeter. An intelligent sensor management system would manage the cameras.
- 3.3.21 Compacted internal crushed stone tracks to allow vehicular access between fields, utilising existing internal gateways / gaps where possible. For single tracks, the width typically ranges between 4-5 m.



Drainage and water storage tank

- 3.3.22 At the BESS Site, a water tank of approximately 2.2 m in height with a capacity of 228,000 litres is proposed in the southwest corner, as indicated on the Water Tank drawing (Ref 16).
- 3.3.23 The proposed drainage strategy for the Site is appended to the ES as **Appendix B.3**.

Access

- 3.3.24 Vehicle access to the Solar Site is proposed to be taken from Rhuddlan Road at five proposed access points. Two access points are noted as primary accesses, and three alternative access points are noted as secondary access points. Three access points are to be taken from the northern side of Rhuddlan Road, and two are to be taken from the southern side of Rhuddlan Road.
- 3.3.25 Construction vehicle access to the BESS Site is to be taken from the unnamed carriageway that runs south of Glascoed Road (B5381). Operational access is from the south.
- 3.3.26 Internal to the Site, compacted crushed stone tracks would be installed to allow vehicular access between fields, utilising existing internal gateways/gaps and crossing points over ditches as far as practicable. For single tracks, the width typically ranges between 4-5 m. An Internal Access Track plan (Ref 17) is submitted as part of the Planning Drawings in **Appendix A.9**.

Landscaping and biodiversity enhancements

- 3.3.27 The Proposed Development will deliver significant biodiversity and landscape enhancement including habitat creation, tree and hedgerow planting.
- 3.3.28 The landscaping and biodiversity proposals are shown on the submitted Illustrative Landscape and Ecology Strategy for both the Solar and BESS Sites.
- 3.3.29 This is summarised as:

	Solar Site	BESS Site
New Trees (No)	127	33
Hedgerow Enhancement (m)	1000	1265
New hedgerow (m)	8081	123
Woodland Groups/Copse (m2)	9202	N/A

Cable route and Point of Connection

- 3.3.30 As above, the Cable Corridor links the various parcels together within the Solar Site and then connects the Solar Site with the BESS Site and subsequently to the Point of Connection (PoC) at the National Grid Bodelwyddan Substation.
- 3.3.31 The electricity generated by the proposed solar farm will be exported to the National Grid at Bodelwyddan substation. The proposed cables will all be entirely underground and those which link the Solar Site to the BESS Site are likely to comprise 2 x 33kV cables. The trenches for the underground cables will be approximately 750 mm deep.
- 3.3.32 The underground cables will also facilitate the import of electricity from National Grid to the BESS.



Other

Utilities

- 3.3.33 Utilities have been scoped into this ES in response to comments received from SPEN who highlighted the need to demonstrate how potential impacts on their existing infrastructure would be managed and mitigated.
- 3.3.34 In response to this, the Applicant has engaged directly with SPEN to review the layout of the Proposed Development and ensure that appropriate buffers have been applied. Plans have been shared with SPEN to confirm the design avoids conflict with existing infrastructure.
- 3.3.35 Consultation is ongoing and SPEN have indicated that any remaining concerns can be addressed through the provision of a method statement and a suitably worded planning condition to secure final design details in addition to a separate agreement for asset protection measures.
- 3.3.36 Given this proactive engagement and the nature of SPEN's response, it is considered that utilities have been addressed.

Lighting

- 3.3.37 No structures on-Site would be permanently lit. No lighting would be attached to the perimeter fencing or for Site access purposes. Lighting is not required within the Solar Site for the operational period of the Scheme (only, potentially, during the construction phase). Motion sensing security lighting will be provided within substations and within the BESS Site to be used only for maintenance and security purposes.

3.4 Construction

Construction Duration and Working Hours

- 3.4.0 The estimated construction period for the Proposed Development is 12-24 months. A detailed construction programme will be developed by the construction contractor when appointed and this will be provided to the Council as part of a CEMP prior to commencement of construction. It is expected that this will form a planning condition on any consent.
- 3.4.1 Normal construction hours will be between 07.00 and 18.00 Monday to Friday and 08.00 to 13.00 on Saturdays.

Waste Management

- 3.4.2 Schedule 4 of the EIA Regulations states that this ES should include a description of the development including:
- "an estimate, by type and quantity, of the expected residues and emissions (such as water, air soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during construction and operational phases".*
- 3.4.3 The construction works will be undertaken in accordance with legal requirements, and it is proposed that waste will be minimised by moving waste up the waste hierarchy, avoiding waste during construction, diverting as much waste as possible from final disposal to more sustainable waste management options.
- 3.4.4 Construction waste will be recycled wherever possible on the Site. Volumes to be exported off-site are not anticipated to be significant given the nature of the Proposed Development and will be managed through a licensed off-site contractor.



Temporary Infrastructure and Enabling Works

3.4.5 The following components would form temporary features throughout the construction phase of the Proposed Development:

- Temporary enabling works and construction compound; and
- Hardstanding for lay down areas.

3.5 Operation and Maintenance

3.5.0 The Proposed Development has a proposed operational lifespan of 40 years. During the operational phase maintenance activities, including servicing of plant and equipment and vegetation management, will be undertaken.

3.5.1 During the operational period, at the Solar Site, there will be limited maintenance and management to include module cleaning to maximise solar intake (typically annually via a tractor towing a water tank). This is normally undertaken in spring or early summer, when ground conditions are suitable. Overall vehicle trafficking will be lower than the existing/current agricultural uses associated with the Site.

3.5.2 At the BESS Site, there will also be limited maintenance, likely to comprise routing inspections by technicians and occasional cleaning / maintenance as required.

3.6 Decommissioning

3.6.0 Following the operational period of 40 years, the Proposed Development will be decommissioned, and the Site returned to its current agricultural use. All solar arrays and BESS infrastructure including modules, mounting structures, cabling, inverters and transformers would be removed and recycled or disposed of in accordance with good practice available at the time. Additional measures of the decommissioning phases have been recommended and are detailed within **Chapter 5** and the oDEMP (**Appendix A.6**).

3.7 Primary Mitigation

3.7.0 In accordance with Regulation 17(3)(c) of the EIA Regulations the assessment has assessment taken account of primary mitigation which is inherent in the scheme design. The key primary mitigation which forms part of the Proposed Development includes the following, with discipline specific primary mitigation listed within each chapter:

- Preparation of the Drainage Strategy to identify design measures to be implemented within the Proposed Development to reduce the risk of flooding and improve drainage across the Site;
- Layout optimisation of the Proposed Development to avoid sensitive receptors as far as practicable;
- Introduction of setback distances by removing panels in specific areas of the Solar Site to improve amenity for the most affected residents;
- Location of solar inverters to ensure no potential noise impact on local residents;
- An Ecological Mitigation and Enhancement Area, totalling approximately 10 ha, has been designed within the proposals to provide enhanced habitat for a range of species. This area will provide enhanced year-round foraging and breeding opportunities for the farmland bird assemblage potentially displaced from the Solar Site, and is located immediately to the south of it; and



- Retention and buffering of habitats of value within and adjacent to the Site including vast majority of hedgerows , wet and dry ditches, main running water ditch, ponds, mature trees and woodland.

3.8 Tertiary Mitigation

3.8.0 The key tertiary mitigation includes the following, with discipline specific tertiary mitigation listed within each chapter.

- The CEMP will set out the environmental issues and management procedures to be adopted during the construction works on Site to help control potential temporary adverse impacts to the environment and local community. An oCEMP will be submitted as part of the planning application (**Appendix A.5**) and form part of the tertiary mitigation. Some measures in the CEMP have been considered as 'secondary' mitigation in each of the technical ES Chapters 6 -12, as further detail will be required at later stages of the planning process. The full CEMP will be secured by a planning condition.
- The Construction Traffic Management Plan (CTMP).
- A detailed LEMP would be prepared in accordance with the submitted Outline LEMP (which accompanies the with the planning application) and submitted for approval by the LPA(s) secured by a planning condition.

3.9 Secondary Mitigation

3.9.0 Measures which require further activity to be achieved, and do not form an inherent part of the Proposed Development, are referred to as Secondary mitigation.

3.9.1 Secondary mitigation (and enhancement) measures are summarised in **Chapter 15 – Schedule of Mitigation Monitoring**. Along with the Primary and Tertiary mitigation, these measures are proposed to be secured through suitably worded planning conditions attached to any forthcoming consent.



4 Alternatives & Design Evolution

4.1 Introduction

4.1.0 Under the EIA Regulations for Wales, an ES is required to provide a description of the reasonable alternatives studied by the Applicant and the reasons for the choices made including a comparison of environmental effects.

4.1.1 Regulation 17 (3)(d) of the EIA Regulations require an applicant to provide:

- *“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;”.*

4.1.2 Schedule 4, paragraph 2 is worded slightly differently and requires:

- *‘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.’*

4.1.3 This legal requirement is expressed in very general and high-level terms, requiring only the inclusion of “reasonable” alternatives and an “indication” of “main” reasons. Although a full description of alternatives and a full assessment of their likely environmental effects are not required, sufficient detail should be provided to allow for a meaningful comparison between the alternatives and the Proposed Development.

4.1.4 Alternatives should only be considered where they are feasible, realistic, and genuine. This may depend on various factors, including planning policy, land ownership, financial viability, technical feasibility, and design quality. Options which are unlikely to be acceptable, or deliverable are not realistic alternatives and so do not need to be considered.

4.1.5 Whilst environmental effects are relevant when choosing between alternatives, other factors are also relevant. The main selection criteria which the Applicant have used when choosing between the alternatives which it has considered include planning policy, viability, design quality, market requirements, site constraints and opportunities and environmental effects.

4.1.6 The following provides an outline of the reasonable alternatives considered in relation to the Proposed Development and the main reasons for choosing the Proposed Development in preference to them, including a comparison of the environmental effects.

4.2 The ‘Do Nothing’ Alternative

4.2.0 The ‘do nothing’ alternative refers to the option of leaving the Site in its current state, as described in **Chapter 3 - Site and Development Description**, and the Proposed Development would not be progressed. In this scenario, the existing configuration of the land would remain the same in the form of agricultural fields that are predominately used for agricultural purposes. As such, the significant impacts both adverse and beneficial that are highlighted in this ES would not occur. It is noted that in this scenario, there would be a continuation of agricultural uses at the Site whereby intensive arable uses would continue to result in a reduction in soil quality and structure, in addition to emissions associated with agricultural vehicles.

4.2.1 The generation of solar energy and battery storage are key elements towards the UK and Wales achieving net zero carbon, in line with their respective legislative commitments. The ‘do nothing’ alternative would result in no change to current emissions levels and therefore



would not contribute to reducing the overall concentration of greenhouse gases in the atmosphere. Under current legislation and policy, the UK Government is obligated by law to reduce carbon emissions and to achieve net zero carbon emissions by 2050 and Wales has committed to all consumed energy to be from renewable sources by 2035. These obligations underpin the need for renewable energy, such as solar. The Proposed Development will have an export capacity of approximately 110MW at the Solar Site and an import capacity at the BESS Site of 110MW. Should the Proposed Development not be taken forward, its energy-generating potential and potential carbon savings would not be achieved. The Site would not contribute to decarbonising the grid. The 'do nothing' alternative would result in the loss of the generation and storage of this renewable energy in line with UK Government and Welsh Government targets, resulting in continued reliance on fossil-fuel-based energy sources. therefore, the Applicant did not consider this to be an acceptable or realistic alternative option.

- 4.2.2 Finally, the Proposed Development includes embedded ecological enhancements as proposed in the Landscape and Ecology Strategy which are designed to improve both landscape structure and biodiversity at the Site (e.g. pollinator-friendly planting, hedgerow restoration, managed grassland, new trees and hedgerows, hibernacula, bird and bat boxes, scrapes and ponds) all of which result in a significant biodiversity net benefit and increase the Site's potential for carbon sequestration (e.g. through improved soils, hedgerows and habitat creation). In the 'do nothing' alternative, these biodiversity enhancements and improvements to the landscape structure will not occur. The Site's potential contribution to climate mitigation through, for example carbon storage, flood resilience, pollination etc, will not be realised. The following would not be delivered: 160 new trees, 2,265m of enhanced hedgerows, a net increase of 6,858m of new hedgerows. The Site would remain in its baseline condition, offering limited benefit to biodiversity and climate resilience.

4.3 Consideration of Alternative Locations & Uses

- 4.3.0 The Site selection exercise has been undertaken with regards to a number of different planning policy, environmental, and technical criteria including;
- The availability of grid capacity and a viable grid connection;
 - Land availability;
 - Statutory planning, environmental and ecological designations;
 - Agricultural Land Classification;
 - Proximity to local population;
 - Topography and irradiance; and
 - Access.

The availability of grid capacity and a viable grid connection

- 4.3.1 The starting point for any renewable energy generation project is identifying a part of the national grid where there is available grid capacity for a viable connection. This operational requirement places a locational restriction on site selection that limits the number of appropriate sites for larger scale renewable energy projects, as well as their distance from this available grid capacity.
- 4.3.2 There is an identified shortage of viable grid connections in the UK. The Applicant benefits from a beneficial grid connection in close proximity and as an accepted grid offer with National Grid, both of which would facilitate the delivery of the Proposed Development in the short term, making an early and significant contribution to the statutory Net Zero target.



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- 4.3.3 The Proposed Development must be located near to an existing grid connection. In this case the BESS Site lies directly adjacent to the Point of Connection (PoC) at Bodelwyddan substation which offers numerous benefits in terms of grid efficiency associated with the import and storage of electricity which feeds into Bodelwyddan Substation. There are reduced transmission losses (minimising the length of cabling between the BESS and the PoC which reduces electrical losses and improves overall system efficiency), lower infrastructure costs (such as shorter cable runs and fewer intermediate substations/switchgear installations) and faster construction and improved grid stability (faster response times for grid services, enhanced control over load balancing and export/import management). This helps improve the overall efficiency and viability of the development.
- 4.3.4 The Solar Site, which necessitates a larger area of land to provide the generation capacity, is located approximately 3.5km (as the crow flies) to the north west of the BESS Site and the PoC. As a result, the selection of the Solar Site was primarily driven by various factors as set out below.

Land availability

- 4.3.5 The availability of suitable land is a key factor in the site selection process for the Proposed Development. The Applicant considered a range of alternative locations within the region, but many were discounted due to constraints such as proximity to residential settlements, lack of grid connection opportunities, or unsuitable topography.
- 4.3.6 There needs to be landowner willingness to release land required for any Proposed Development. The Applicant wrote to a number of landowners within the wider area as an expression of interest but did not receive any response (with the exception of the landowners for the BESS Site and the landowners of the Solar Site). The Applicant has agreed terms with a landowner for the Proposed Development.

Statutory planning, environmental and ecological designations

- 4.3.7 The Applicant has selected a site that is not in an environmentally sensitive location. The Site is not located within or adjacent to any international, national or local nature conservation or environmental designations as set out in **Chapter 10** of this ES .
- 4.3.8 The Site is not subject to or adjacent to any local landscape designations. It is not for example within or near a National Park or National Landscape as set out in **Chapter 11** of this ES.
- 4.3.9 The Site is not subject to any other planning allocations or designations, for example the Green Wedge.

Agricultural Land Classification

- 4.3.10 This section should be read in conjunction with the Planning Statement section 7.18 Soils and Agricultural Land.
- 4.3.11 The PPW paragraph 3.58 states that agricultural land of grades 1,2 and 3a of the ALC system is the best and most versatile (BMV) and should be conserved as a finite resource for the future. Paragraph 3.59 goes on to states that *'when considering the search sequence... considerable weight should be given to protecting such land from development because of its special importance'*.
- 4.3.12 The Applicant has sought to select a Site which limits the amount of BMV land proposed for development as much as possible, having regard to applicable planning policies. An extract from the Predictive Mapping is provided below (**Figure 4.1**), with the Solar and BESS Sites identified which demonstrates that both Sites are located in areas predominantly identified as Grade 3b (not BMV) and generally within 'pockets' of Grade 3b which is the best area within the Predictive Mapping. Indeed, there are limited opportunities within the wider area surrounding the point of connection (at Bodelwyddan substation) to accommodate a site of the



scale that is required to accommodate a solar farm of approximately 110MW generation capacity in addition to a BESS development close to the PoC .

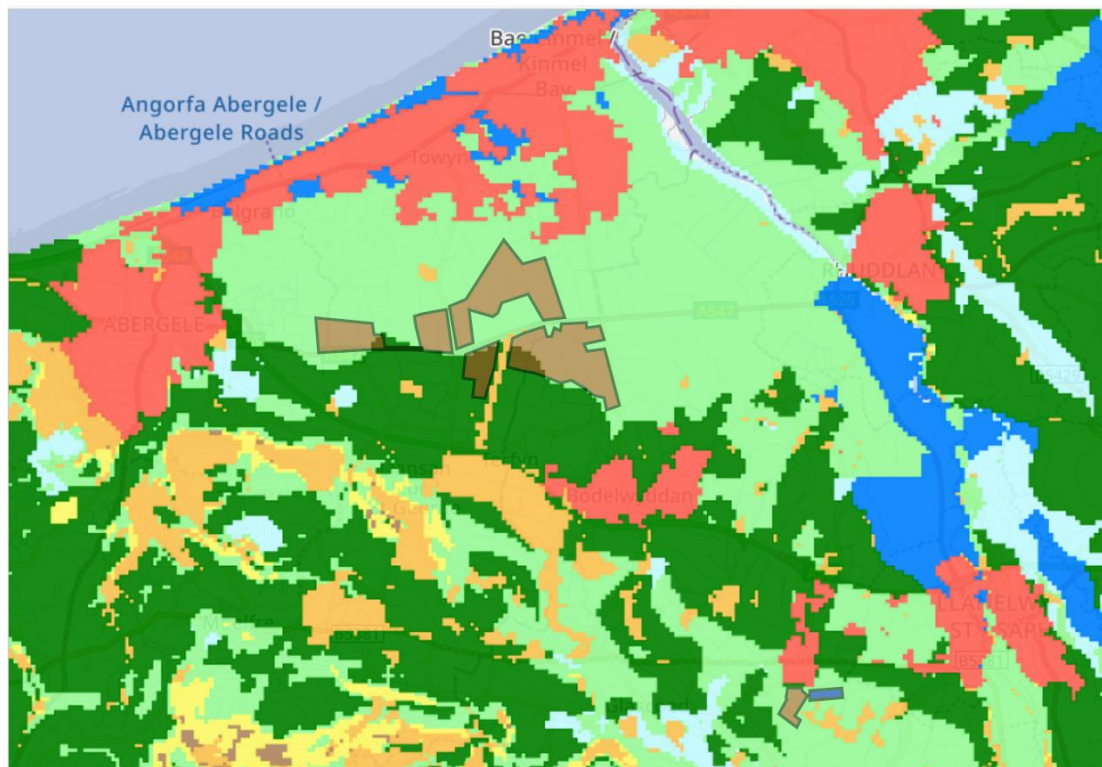


Figure 4.1: Extract of BMV Land for BESS and Solar Site

- 4.3.13 Following this, an ALC Report (**Appendix I.2**) was subsequently undertaken which confirms that the Site predominantly comprises Subgrade 3b (“moderate quality”) land, amounting to over 94% of the total area. Only 11.3 ha (c. 6.6%) of the Site is identified as Subgrade 3a, with no higher grades (1 or 2) present. The ALC report confirms that there is no BMV land within the BESS Site as it is entirely Grade 3b.
- 4.3.14 It also confirms that the Solar Site does have some BMV albeit slightly less BMV than indicated on the Predictive Mapping as above (for example in field parcel 6). It notes the land has moderately high topsoil clay content and imperfect drainage with means the land is often too wet for winter and early spring machinery land access limiting its use. As set out in the Planning Statement section 7.18, the limited Grade 3a land within the Solar Site occurs in small, scattered pockets interspersed within larger fields of Subgrade 3b, rather than as a single consolidated block. This fragmentation significantly reduces its practical agricultural utility, as these areas cannot readily be managed as independent BMV fields. In effect, the distribution of this 3a land dilutes its contribution to the overall agricultural value of the holding.
- 4.3.15 As such, the Site does not represent a uniquely high-value agricultural resource and it has been demonstrated that the Applicant has sought to select a Site within an area of lower agricultural grade (i.e. predominantly Grade 3b) to ensure the protection of the higher value resources (i.e. Grades 1, 2 and 3a) in the wider area. Furthermore, the selection of this Site does not result in the permanent loss of BMV land. Given the land quality across the local context, there is no compelling agricultural justification to assess an alternative site elsewhere.

Proximity to Local Population

- 4.3.16 The Site was identified during the selection process as being suitably located away from densely populated areas, thereby reducing the potential for adverse effects on residential receptors and settlements. The Sites position was favourable due to the limited number of

individual properties in proximity and the potential to incorporate landscape buffers to screen sensitive visual receptors. The LVIA findings confirm that this has been successful.

Topography and Irradiance

- 4.3.17 Flat or gently undulating land is preferred for solar development because it simplifies construction, reduces risk of shadowing between solar arrays, and ensures more consistent energy generation. Additionally, where the surrounding topography is also flat or gently sloping, such sites tend to be less visually prominent in the landscape compared to developments on elevated or steeply sloped terrain, thereby helping to minimise potential visual impacts on nearby receptors. .
- 4.3.18 The overall topography of the Site is generally flat or gently undulating which makes it suited to a large-scale solar development due to the large open area of undeveloped land (with minimal obstructions such as trees or buildings that create shade) which would provide uniform exposure to irradiance.

Accessibility

- 4.3.19 Vehicular access is also a key consideration in the identification and selection of suitable Sites. The Site (i.e. the Solar Site and BESS Site) benefits from a number of existing access points which can be utilised to serve the Proposed Development.
- 4.3.20 The Site does not have any PRoWs running through it and as such there would be no direct impact on PRoWs during construction or operation.



5 Construction Methodology and Phasing

5.1 Introduction

5.1.0 This Chapter sets out the information on the anticipated construction and decommissioning methodology of the Proposed Development and Site management measures.

5.1.1 Given the nature of the Proposed Development, planning for construction and decommissioning is necessarily broad at this stage and may be subject to modification. This initial assessment is based on reasonable assumptions and experience and allows assessment of the realistic construction and decommissioning effects.

5.2 Construction Management and Programme

5.2.0 It is anticipated that the construction phase will commence in late 2027 / early 2028, based on anticipated timescales for determination. The construction phase is anticipated to take approximately 12-24 months. The operational period is 40 years.

5.2.1 Construction activities and deliveries will be carried out Monday to Friday 07:00-18:00 and between 08:00 and 13:00 on Saturdays. No construction vehicle movements will be permitted during peak hours. No construction activities or deliveries will occur on Sundays or on Public Holidays. A CTMP will set out measures to manage deliveries in a way that seeks to reduce local impacts, which has been prepared by the Applicant and has been submitted with this application (**Appendix A.7**).

5.2.2 Management measures include:

- Construction traffic routeing (as detailed in Section 2 of the oCTMP);
- Any excavated soil will be reused for backfilling or in the creation of banks;
- There will be no contact with muddy / dirty ground as all delivery vehicles traverse the hard standing and therefore none or very little debris should be tracked out on to the road outside, with no field plant tracking on to road outside. There will be road sweeping and wheel washing services available should the need arise;
- A Banksman will be used to aid HGV deliveries arriving and leaving the site where required;
- Delivery restrictions;
- Vehicles will be serviced and kept to a road / work worthy state through regular inspections;
- Fuels are to be stored within the fuelling area / diesel bowser where they must be stored in double skinned bunded tanks with drip trays and spill kits. Fuelling is prohibited elsewhere on Site;
- Contractors will be required to conform to the construction noise code of practice BS 5228; and
- Incident and Pollution prevention measures and emergency response procedure.

5.2.3 During the construction phase, temporary construction compounds will be required to facilitate construction. At the Solar Site, there are two compounds; north of Rhuddlan Road in parcel 1 and south of Rhuddlan Road in parcel 5, both of which are near to the primary construction accesses to minimise HGV traffic within the Site. At the BESS Site, a single compound is proposed in the southern part of the BESS Site.



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- 5.2.4 The internal access tracks will facilitate the movement of construction vehicles around the Site. Where possible, these will follow existing tracks around the Site and be of a fully permeable construction. This secure temporary construction compounds will be used to store materials and provide welfare facilities during the construction period.
- 5.2.5 The temporary compounds will be formed of a temporary permeable hardcore / gravel base atop a mesh membrane to facilitate ease of removal when construction is complete. Compounds will include:
- Temporary gated security fencing (e.g. Heras Fencing) and temporary CCTV cameras;
 - Temporary portable buildings to be used for offices, welfare, and toilet facilities;
 - Materials and equipment storage areas;
 - Parking and turning areas for delivery vehicles and workers' vehicles; and
 - Wheel washing facilities.
- 5.2.6 The activities on-Site during the construction phase are expected to include the following:
- Site establishment and enabling works for construction, including the erection of perimeter fencing and implementing any required ecological/environmental protection measures;
 - Implementation of temporary construction facilities, temporary security measures and internal access track;
 - Deliveries and construction of the solar farm, including the installation of mounting framework, solar panels, inverters, switchroom and ancillary infrastructure;
 - Deliveries and construction of BESS infrastructure, transformer and other ancillary infrastructure;
 - Cable trenching, ducting and backfilling to connect the Solar Site to the BESS Site and to the PoC at Bodelwyddan substation;
 - Testing Commissioning of the Solar and BESS equipment; and
 - Landscaping and biodiversity enhancements.
- 5.2.7 Environmental effects associated with the construction phase will be managed through a CEMP which will be prepared by the Principal Contractor and agreed with CBBC and DCC before works commence on the Site. Responsibility for implementing the CEMP will lie with the Principal Contractor. The CEMP outlines, as appropriate, the measures to be implemented during construction to mitigate environmental effects.
- 5.2.8 For the purposes of the assessments within the ES an oCEMP is included in **Appendix A.5**. Specific measures will be set out in the oCEMP, and as noted within each topic chapter of the ES, are treated as tertiary and secondary mitigation.
- 5.2.9 The CEMP will provide a framework to govern the construction works including further information on the roles, responsibilities and communications during construction, construction management and methodology, and mitigation measures associated with construction traffic, air quality and dust, noise and vibration, and contamination and ground conditions.



5.3 Construction Traffic

- 5.3.0 Construction will be carried out over the course of approximately 12-24 months. This includes the preparation of the site, erection of security fencing, assembly, and installation of substation and cable works.
- 5.3.1 It is anticipated that there will be a maximum 101 construction workers on site at any given time, and it is anticipated that a significant proportion of the workforce will be shuttled to the Site using minibuses, aiming to reduce the impact on both the wider and local road network. For robustness it will be assumed that all construction workers will arrive by private vehicle.
- 5.3.2 This means that there could be in the region of 40 additional two-way trips (subject to the level of construction activity) on the local highway network at the start and end of the day.
- 5.3.3 It is anticipated that the majority of trips will take place in the morning and evening peaks, however, it is also anticipated that there will be a negligible number of trips throughout the working day though there may be some additional visitors to Site during the construction period.
- 5.3.4 Based on the distribution of trips over the 24-month construction period and assuming a 26-day working month, this translates to an average of 106 HGV two-way trips per day during peak months.
- 5.3.5 This is considered to represent an immaterial impact on the local highway network since there are very few receptors likely to be impacted by this increase in traffic.
- 5.3.6 To manage construction traffic and so that traffic does not travel on inappropriate roads, construction vehicle access routes have been identified for the Proposed Development.
- 5.3.7 Construction access to the Site is still to be finalised but is anticipated to be provided from Rhuddland Road to the Solar Site and the B5381 (Glascoed Road) for the BESS Site.
- 5.3.8 A CTMP will be submitted with the planning application and an outline version is provided in **Appendix A.7**.

5.4 Construction Noise Mitigation

- 5.4.0 Construction activities can give rise to noise associated with the works required to construct the Proposed Development. The piling of the supporting structures to the solar array framework is typically the activity which generates most noise at the Solar Site during the construction phase. The construction works for the Solar and BESS Site would primarily consist of installation of solar panels, battery energy storage units, substations and other ancillary units along with access routes. It is considered that these works would be relatively small in scale and as such would be unlikely to result in noise or vibration levels that are significant over a long period. Where possible, plant and equipment utilised in construction works, will be deployed with suitable noise mitigation or specification (i.e., the quietest plant or construction method feasible) in any sensitive areas.

5.5 Construction Waste

- 5.5.0 During the construction period, measures will be put in place to minimise waste and opportunities for recycling maximised, including through implementation of the CEMP. All relevant recycling and waste regulations and policy will be followed at all times which will include the Waste and Electrical and Electronic Equipment Regulations 2013⁸. Construction waste will be managed and minimised in line with the Waste Hierarchy. The waste management methods in order of preference are as follows:

⁸ [The Waste Electrical and Electronic Equipment Regulations 2013](#)



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- Waste Prevention – Through good design and procurement mechanisms.
- Preparation for Reuse – To provide design features to the Proposed Development to use materials in their current state and form, this can occur either on or off Site.
- Material Recovery – By using waste materials found on site and recycling / recovering them into an alternative form that can be used for construction purposes.
- Other Recovery – Energy recovery from biodegradable or combustible materials.
- Disposal – The least preferred option where the waste stream would be subject to a final disposal route, such as landfill.

- 5.5.1 Any non-hazardous waste produced is likely to be primarily packaging and cable off cuts. This waste will be stored in a covered skip and recycled or appropriately disposed.

Details of Emergency Procedures

- 5.5.2 Emergency contact details for the Site / H&S manager will be placed on a notice board near the Site entrance. As detailed in the CEMP (**Appendix A.5**) the Principal Contractor will develop and implement an incident control procedure for the project, they will also set up and manage systems, procedures and equipment for emergency planning and develop incident control procedures.

5.6 Material and Resource Use

- 5.6.0 The primary construction materials to be used will include silicon, aggregate, steel, aluminium timber. Associated electrical equipment, such as the inverters, battery units and transformers will likely be delivered to the Site in containerised form. Where possible, materials and resources used during the construction of the Development will be sourced from the local area. Materials likely to be sourced locally include stone and fencing.

Controls to Protect the Environment

- 5.6.1 The environmental controls (or mitigation measures) to eliminate, reduce or offset likely significant adverse effects on the environment during the construction phase (as identified above) are identified below. It is anticipated that these controls will be secured by appropriately worded planning conditions or obligations:
- 5.6.2 An oCEMP (**Appendix A.5**) has been prepared for the Proposed Development as part of this planning application. A detailed CEMP will be secured via planning condition prior to the commencement of the Proposed Development which would consolidate the various mitigation measures identified in this ES and would be agreed with DCC, CCBC and relevant statutory bodies.
- Requirement to comply with the CEMP included as part of the contract conditions for each element of the work. All contractors tendering for work will be required to demonstrate that their proposals can comply with the content of the CEMP and any conditions or obligations secured through the planning permission;
 - A CTMP has been prepared as part of the Transport Statement (submitted as part of the planning application) to outline traffic management procedures during the construction phases. Details of the CTMP will be secured via a planning condition;
 - In respect of necessary departures from the above, procedures for prior notification to DCC and CCBC, as appropriate, and affected parties will be established;



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- Establishing a dedicated point of contact and assigning responsibility to deal with construction related issues if they arise. This will be a named representative from the construction team; and
- Regular dialogue with DCC, CCBC and the local community.

5.6.3 The preparation of the CEMP is an established method of managing environmental effects resulting from construction works. Following a secured planning condition, the CEMP will be submitted to DCC, CCBC (and other statutory authorities) for approval prior to the commencement of the works. The structure of the CEMP will include the following:

- A table showing the objectives, activities (mitigation / optimisation measures), and responsibilities for the implementation of those activities;
- The broad plan of the work programme including working hours and delivery times;
- Details of prohibited or restricted operations (location, hours etc);
- Institutional arrangements for its implementation and for environmental monitoring: responsibilities, role of the environmental authorities, participation of stakeholders;
- Contact during normal working hours and emergency details outside working hours;
- Provision for reporting, public liaison, and prior notification of particular construction and decommissioning-related activities;
- The mechanism for the public to register complaints and the procedures for responding to such complaints; and
- The details of proposed routes for HGVs travelling to and from the Site.

5.6.4 Low levels of waste materials are expected during the construction phase due to the nature of the Proposed Development. The photovoltaic panels will be recycled, in accordance with the legislative requirements in place at the time⁹ or re-used for other uses or projects in the local area once the Proposed Development is decommissioned.

5.6.5 To facilitate materials being handled in line with sustainable management principles, the CEMP will include appropriate waste management measures with the aims of achieving efficient use of material resources; minimising the amount of waste produced; and achieving, as far as possible, zero waste to landfill. The exact waste management measures will be set out in the CEMP but could include:

- Guidance for the provision for the segregation of waste streams on Site that are clearly labelled;
- A mechanism to record the proposed carriers and licences for disposal sites;
- An audit trail encompassing waste disposal activities and waste consignment notes;
- Measures to provide adequate training and awareness through toolbox talks; and
- Outline of opportunities for reuse and recycling.

⁹ Welsh Government (2025), [Workplace recycling | GOV.WALES](https://gov.wales/workplace-recycling)



5.7 Decommissioning

- 5.7.0 Following the operational period of 40 years, the Proposed Development will be decommissioned, and the Site returned to its current agricultural use.
- 5.7.1 All solar array and BESS infrastructure including modules, mounting structures, , inverters and transformers would be removed and, materials reused, recycled or disposed of in accordance with good practice and the legislative requirements in place at that time. The future of the electrical compound including the substation would be discussed with the distribution network operator and agreed with the landowner, DCC and CCBC prior to commencement of decommissioning.
- 5.7.2 These works would be undertaken according to legislation, regulations and best practice that are current at the time of decommissioning.
- 5.7.3 An outline Decommissioning Environmental Management Plan (oDEMP) (**Appendix A.6**) will be prepared to establish that decommissioning is undertaken in accordance with prevailing good practice at the time. A detailed DEMP will be secured via planning condition prior to the commencement of the Development. The DEMP will include similar measures to those included in the CEMP submitted with the Application, covering issues such as:
- Transportation methods;
 - Pollution prevention; and
 - Noise management.
- 5.7.4 In addition, the oDEMP will include details of ecological survey(s) to be undertaken prior to the commencement of decommissioning works to inform potential sources of impacts and necessary mitigation/compensation required to ensure legal compliance.
- 5.7.5 The decommissioning programme will likely involve the following steps:
- Installation of loading, packing and welfare compounds
 - Panel dismantling;
 - Panel support removal;
 - CCTV infrastructure removal;
 - Substation and inverters pile removal
 - Fencing removal;
 - Roads and foundations removal; and
 - Cable removal.



6 Flood Risk and Water Resources

6.1 Introduction

- 6.1.0 This Chapter of the ES assesses the likely significant effects on Flood Risk and Water Resources produced by the Proposed Development. The assessment is based on the characteristics of the Site and surrounding area, as well as the key parameters of the Proposed Development detailed in **Chapter 3 – Site and Development Description**.
- 6.1.1 This Chapter is supported by, and should be read in conjunction with, the following Appendices:
- **Appendix B.1:** Flood Consequence Assessment
 - **Appendix B.2:** Water Framework Directive Screening and Scoping Assessment
- 6.1.2 This Chapter has been prepared by Calibro Consultants. In accordance with Regulation 17(4) of the Town and Country Planning (Environmental Impact Assessment) Wales Regulations 2017, as amended, a statement describing the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix A.4**

6.2 Policy Context, Legislation, Guidance and Standards

Legislation

- 6.2.0 The Water Framework Directive 2000/60/EC¹⁰ (WFD) establishes a framework for a European wide approach to action in the field of water policy. The aim of the WFD is to ensure no deterioration from current status for all inland and near shore watercourses and water bodies (including groundwater) and to ensure attainment of 'Good' status or better, in terms of ecological, but also chemical, biological and physical parameters. It also contains provisions for controlling discharges of dangerous substances to water. The WFD is implemented in Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and Natural Resources Wales (NRW) has oversight of the regime.
- 6.2.1 Any activities or developments that could cause detriment to a nearby water resource or prevent the future ability of a water resource to reach its target status, must be mitigated so as to reduce the potential for harm and allow the aims of the WFD to be realised.
- 6.2.2 The Water Resources Act 1991 (WRA), sets out the relevant regulatory controls that provide protection to water bodies and water resources. The WRA governs water abstraction, discharge to water bodies, water impoundment, conservation and drought provision and was amended by the introduction of the Water Act in 2003. Under section 85 of the Water Resources Act it is an offence to "*cause or knowingly permit the discharge or other entry of poisonous, noxious or polluting matters or any solid waste matter into controlled waters (as defined under section 104 of the Act)*".
- 6.2.3 The Environmental Permitting Regulations (England and Wales) Regulations 2010 place a duty on Natural Resources Wales to protect groundwater, by prohibiting discharges of hazardous substances to groundwater and controlling the discharge of non-hazardous substances to groundwater.
- 6.2.4 The Flood and Water Management Act 2010 clarifies the legislative framework for managing flood risk and coastal erosion in England and Wales and defines the roles and responsibilities of risk management authorities. The act led to the creation of Lead Local Flood Authorities

¹⁰ Water Framework Directive (WFD) 2000/60/EC (http://ec.europa.eu/environment/water/water-framework/index_en.html)



(LLFAs), which have the lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses.

- 6.2.5 Schedule 3 of the Flood and Water Management Act was implemented in Wales in January 2019. This places a requirement on developments of more than one dwelling house or where the construction area is 100 square meters or more to include sustainable drainage systems (SuDS) for managing surface water. The SuDS must be designed and built in accordance with Statutory SuDS Standards¹¹. They should also be approved by the local authority acting in its SuDS Approving Body (SAB) role.

National Policy

- 6.2.6 Future Wales is the national development framework for Wales. It sets the development direction to the year 2040 through addressing key national priorities through the planning system, including achieving climate resilience.
- 6.2.7 Flood risk and sustainable water management are core themes throughout the document. Policy 8 – Flooding - compliments Planning Policy Wales in that flood risk management should support strategic growth. Policy 8 also introduces a hierarchy of prioritising places that are not at risk of flooding, followed by places where flood risks can be managed. Policy 9 – Resilient Ecological Networks and Green Infrastructure refers to the need to safeguard areas to provide key ecosystems services such as flood management.
- 6.2.8 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government to ensure the planning system contributes to the delivery of sustainable development.
- 6.2.9 PPW is supplemented by a series of TANs, Welsh Government Circulars and policy clarification letters, which together with Future Wales provide the planning policy framework for Wales.
- 6.2.10 TAN15: Development, flooding and coastal erosion (TAN15) provides technical guidance for assessing flooding associated with proposed development. This includes the definition of the Flood Map for Planning Flood Zones 1, 2 and 3 and Defended Zones (or “flood risk areas”), which form the starting point for any assessment. TAN15 was updated in March 2025.
- 6.2.11 An overarching principle of TAN15 is to restrict new development in Zone 3, subject to the limited exceptions (including proposals for renewable energy as detailed in paragraph 10.22 of TAN15, summarised below), and to ensure that decision makers have taken flood risk matters into consideration in all other zones.
- 6.2.12 A Flood Consequences Assessment (FCA) must be produced for any proposed development shown to be within Flood Zones 2 or 3 defined by being at risk from a 1 in 1,000-year (0.1% annual exceedance probability) event as shown on the NRW Flood Map for Planning.
- 6.2.13 TAN15 states that the prime objective of a Flood Consequences Assessment (FCA) is to develop a full appreciation of:
- “The risk and consequences of flooding on the development; and
 - The risk and consequences (i.e. the overall impacts) of the development on flood risk elsewhere.” (paragraph 6.4)
- 6.2.14 TAN15 requires that:

¹¹ Welsh Government (2018) Statutory Standards for Sustainable Drainage Systems – designing, constructing, operating and maintaining surface water drainage systems. <https://www.gov.wales/sites/default/files/publications/2019-06/statutory-national-standards-for-sustainable-drainage-systems.pdf>



“The assessment must allow for a range of potential flooding scenarios up to and including that flood having a probability of 0.1% in any year. An allowance for climate change must be made in line with current Welsh Government guidance, published alongside this TAN”. (paragraph 6.5).

- 6.2.15 TAN 15 provides that planning applications in Flood Zone 3 require the strongest justification, stating that development in Flood Zone 3:

*“will only be appropriate if they are essential to the Development Plan Strategy to regenerate an existing settlement or achieve key economic or environmental objectives. Any redevelopment proposal must be consistent with the acceptability considerations in section 11. **Proposals that address national security or energy security needs, mitigate the impacts of climate change, that are necessary to protect and promote public health may also, by exception, be appropriate** provided that their locational need is clear and the potential consequences from flooding have been considered and found to be acceptable” (paragraph 10.23).*

- 6.2.16 Paragraph 10.20 of TAN15 allows exceptions for developments addressing energy security or climate change, provided there is a clear locational need and flood consequences are found to be acceptable.

- 6.2.17 Grid capacity is a key constraint for renewable projects nationally. This Site’s proximity to the Bodelwyddan substation, which is due for extension by National Grid, offers a rare, viable connection point. It represents the most suitable land available for a project of this scale.

- 6.2.18 To underpin the approach to managing flood risk through spatial planning, TAN15 utilises flood zones to delineate areas at risk from different magnitude events. The zones also consider the impact of flood defences. The flood zones are summarised in **Table 6.1**.

Table 6.1: Flood Zones

Zone	Flooding from rivers	Flooding from the sea	Flooding from surface water and small watercourses
1	Less than 1 in 1,000 (0.1%)(plus climate change) chance of flooding in a given year		
2	Less than 1 in 100 (1%) but greater 1 in 1,000 (0.1%) (plus climate change) chance of flooding in a given year, including climate change	Less than 2 in 100 (0.5%) but greater 1 in 1,000 (0.1%) (plus climate change) chance of flooding in a given year, including climate change	Less than 1 in 100 (1%) but greater 1 in 1,000 (0.1%) (plus climate change) chance of flooding in a given year, including climate change
3	A greater than 1 in 100 (1%) chance of flooding in a given year including climate change.	A greater than 1 in 200 (0.5%) chance of flooding in a given year including climate change.	A greater than 1 in 100 (1%) chance of flooding in a given year including climate change.
TAN15 Defended Zones	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from rivers of 1:100 (plus	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from the sea of 1:200	Not applicable



	climate change and freeboard).	(plus climate change and freeboard).	
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- 6.2.19 Flood risk has been thoroughly assessed, in relation to the Proposed Development, through a Flood Consequence Assessment (**Appendix B.1**) and supporting drainage strategy, in compliance with TAN15.

Local Policy

Conwy County Borough Council Local Development Plan 2007 – 2022

- 6.2.20 CCBC adopted the CCBC Local Development Plan¹² (LDP) in October 2013. This was supported by a Strategic Flood Consequences Assessment (SFCA) and contains Strategic Policies, of which Strategic Policy DP/1, part (f) requires proposals to *'Take account of and address the risk of flooding...in line with Policies DP/2 and DP/3.'* Policy DP/3 is the overarching strategic approach with no specific requirements for flood risk or water management.
- 6.2.21 Policy DP/3 seeks to promote good quality design. Part 1 (f) states that the Council requires development *'Provide sustainable urban drainage systems to limit waste water and water pollution and reduce flood risk in line with national guidance and Policy NTE/8 – 'Sustainable Drainage Systems'.*
- 6.2.22 Policy DP/4 gives development criteria with part 2 providing situations where planning permissions would not be granted where proposed development would have an adverse impact on flood risk (part g).
- 6.2.23 Policy NTE/8 relates to the provision of sustainable drainage systems (SuDS) on all developments, with paragraph 4.6.9.2 listing acceptable SuDS measures that includes permeable surfacing.
- 6.2.24 CCCBC are currently collating a replacement Local Development Plan, supported by a Preferred Strategy report¹³, which is currently unadopted. Flooding and flood risk management is a core theme throughout the report with specific strategic policies relating to water quality and flood risk.
- 6.2.25 Strategic Policy SP/25 refers to the need to protect and enhance the water environment, including surface and groundwater quantity and quality. It also refers to the need to embed SuDS within development.
- 6.2.26 Strategic Policy SP/26 specifically refers to flooding and the need to adapt to flood risk. The policy specifically states that *'New development should reduce, and must not increase, flood risk arising from river and/or coastal flooding on and off the development site itself.'*

Denbighshire County Council Local Development Plan 2006 - 2021

- 6.2.27 DCC adopted their Local Development Plan¹⁴ in June 2013. This was supported by an SFRA and contains Local Development Plan Policies, of which Policy RD1 part (xi) requires

¹² Conwy Borough Council (2013) Conwy Local Development Plan 2007-2022.

<https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Assets-written-proposals-maps/Conwy-Local-Development-Plan-2007-2022.pdf>

¹³ Conwy Borough Council (2019) Replacement Local Development Plan 2018 – 2033 Preferred Strategy <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Replacement-LDP/Stage-5-Preferred-Strategy/assets/documents/Preferred-Strategy-web.pdf>

¹⁴ Denbighshire County Council (2013) Denbighshire Local Development Plan 2006 – 2013

<https://www.denbighshire.gov.uk/en/documents/planning-and-building-regulations/ldp/adopted-ldp/adopted-local-development-plan-2006-2021.pdf>



development to satisfy natural environment considerations relating to flooding. Part (xiii) refers to creation or protection of green and blue corridors.

- 6.2.28 Policy VOE6 refers to water management and the requirement to *'Eliminate or reduce surface water runoff from the site, where practicable'* with runoff rates from the site reducing or being maintained.
- 6.2.29 As with CCBC, DCC are in the process of collating a replacement Local Development Plan, supported by a Preferred Strategy report¹⁵. This contained draft Local Development Plan objectives such as Placemaking, which would support proposals that are resilient to the impacts of climate change.

6.3 Consultation

- 6.3.0 Consultation with the authorities has to date been through the formal consultation responses described in **Table 2.1** within **Chapter 2**. Upon completion of the draft FCA, NRW returned comments on the report on 22nd July 2025. The comments have been reflected in the revised FCA (**Appendix B.1**) and this Chapter. Likewise, with the completion of the drainage strategy for the Site, direct engagement with the LLFA has also commenced.

6.4 Methodology

Study Area

- 6.4.0 The Site, in particular the Solar Site, occupies predominantly low-lying land which relies on a complex network of drainage systems including watercourses, culverts and pumping stations. The low-lying nature means flow rates to and from the Site are likely to be relatively slow and consequently mobilised sediment or similar would settle relatively quickly.
- 6.4.1 In accordance with relevant policy and guidance, impacts on flood risks to third parties need to be negated and therefore managed within the red line boundary of the Site, delineated in the Site Location Plan (**Appendix A.1**).
- 6.4.2 For the above reasons, but to promote a catchment -based approach that reflects the nature of the local hydrology, the Study Area extends 500 m from the red line boundary.

Baseline Data Collection

- 6.4.3 An initial desk-based assessment of the Site was carried out. This assessment collated information from NRW, Ordnance Survey, SoilScapes, the BGS, the Water Watch Wales and Data Map Wales websites.
- 6.4.4 In addition to the formal topographic survey, topographic data for the Site has been taken from a 1 m LiDAR DTM.
- 6.4.5 Hydraulic modelling outputs from three models has been supplied by NRW. The three models are:
- St. Asaph Flood Risk Management Scheme – Hydraulic Modelling Report;
 - Afon Gele Flood Risk Study; and
 - The Point of Ayr to Pensarn Tidal Flood Risk Analysis.

¹⁵ Denbighshire County Council (2019) Denbighshire Local Development Plan 2018 – 2033 Draft Preferred Strategy <https://www.denbighshire.gov.uk/en/documents/planning-and-building-regulations/ldp/replacement-ldp/preferred-strategy-and-pre-deposit-stage/draft-preferred-strategy.pdf>



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- 6.4.6 Of these models, a new simulation of the Afon Gele model has been undertaken as part of the Flood Consequences Assessment process to understand the impact of a breach in the local defences inclusive of climate change commensurate with the lifetime of the Proposed Development.
- 6.4.7 The MAGIC website was reviewed to identify relevant statutory and non-statutory designations in the vicinity of the Site. This identified no water-reliant designations within the Study Area.
- 6.4.8 No intrusive ground investigations have been carried out.

Assessment

- 6.4.9 The significance criteria used to assess the potential effects of the Proposed Development are set out below. There are three stages to the assessment of the effect on water resources as follows:
- The sensitivity of the receptor (High to Negligible) based on a number of attributes such as local flood risk and water resource quality (**Table 6.2**).
 - The magnitude of change on the receptor, which is determined based on **Table 6.3** and the assessor's knowledge of the project.
 - An overall Significance of Effect, as set out in **Table 6.4**.
- 6.4.10 The sensitivity of receptor criteria has been derived by accounting for: flood risk function; relevant statutory and non-statutory habitat designations; and ecological and chemical status of surface waterbodies. This is in accordance with the WFD and the groundwater aquifer classifications and source protection zones. The sensitivity has been defined to range from High to Negligible, the criteria and examples of which are set out in **Table 6.2**.

Table 6.2: Derivation of Sensitivity

Sensitivity	Criteria	Example
High	Receptor has very limited capacity to tolerate changes to hydrology, water quality or flood risk.	Waterbody or associated defences which serve a defined flood risk function. Sites of Special Scientific Interest (SSSIs), Ramsar sites, Special Areas of Conservation (SAC), Special Protection Areas (SPA). Surface water bodies with a High overall status as defined by the WFD. Principal Aquifers within Groundwater Source Protection Zones 1.
Medium	Receptor has limited capacity to tolerate changes to hydrology, water quality or flood risk. Water resource with a high quality and rarity at a local scale or water resource with a medium quality and rarity at a regional or national scale.	Waterbody that serves and important flood risk function or is upstream of areas at high risk of flooding. Local Nature Reserves (LNR), Sites of Nature Conservation Interest (SNCI).



Sensitivity	Criteria	Example
		Surface water bodies with a WFD Good ecological status and Good chemical status. Principal Aquifers within Groundwater Source Protection Zones 2-4. Secondary aquifers within Groundwater Source Protection Zones.
Low	Receptor has moderate capacity to tolerate changes to hydrology, water quality of flood risk. Water resource with a low quality and rarity at a local scale	Waterbody that serves limited flood risk function. Surface water bodies with a WFD ecological status ranging from Poor to Moderate and/or a Good chemical status. Areas defined by BGS as Low Productivity Aquifer.
Negligible	Receptor is generally not sensitive to changes to hydrology, water quality of flood risk. Water resource with very low quality and rarity at a local scale.	Surface Water bodies with a WFD Bad ecological status and/or Fail chemical status. Ground defined by BGS as 'rocks with essentially no groundwater'.

6.4.11 The magnitude of change is based on the potential effects on water resource attributes as set out in **Table 6.3**.

Table 6.3: Derivation of magnitude of change

Importance	Criteria	Example
High - Negative	Results in substantial negative effect on attributes of a water resource.	Increase in flood risk to highly vulnerable land uses (as defined by TAN15) or nationally significant infrastructure. Effects that would cause a change to WFD status of a waterbody or have a significant effect on groundwater resources.
Medium - Negative	Results in negative effect on attributes of a water resource.	Increase in flood risk to less vulnerable land use (as defined by TAN15) or locally significant infrastructure. Effects that may cause a change to WFD status of a waterbody or have a moderate effect on groundwater resources.
Low - Negative	Results in minor negative effect on attributes of a water resource.	Increase in flood risk to less vulnerable or water compatible land uses (as defined by TAN15). Effects to a waterbody, but insufficient to change its WFD status.



Importance	Criteria	Example
Negligible	Results in an effect on attribute of a water resource but of insufficient magnitude to affect the use /integrity.	Effects that would have a negligible effect on water quality. Minor increase in flood risk to undeveloped land.
Low - Beneficial	Results in minor positive effect on attributes of a water resource.	Decrease in flood risk to less vulnerable or water compatible land uses (as defined by TAN15). Improvements to a waterbody, but insufficient to change its WFD status.
Medium – Beneficial	Results in positive effect on attributes of a water resource.	Decrease in flood risk to less vulnerable land use (as defined by TAN15 or locally significant infrastructure). Effects that may cause a change to WFD status of a waterbody or have a moderate effect on groundwater resources
High - Beneficial	Results in substantial positive effect on attributes of a water resource.	Significant decrease in flood risk to highly vulnerable land uses (as defined by TAN15) or nationally significant infrastructure. Effects that would cause an improvement to WFD status of a waterbody or have a significant effect on groundwater resources.

6.4.12 The significance scale that has been applied is included in **Chapter 2**. The scale includes seven different classifications ranging from 'Major Beneficial' to 'Major Adverse'.

6.4.13 The significance scale is derived from the interaction of the receptor sensitivity and the magnitude of change criteria. The shading in **Table 6.4** indicates those significance ratings that are deemed to be '**significant**' effects.

6.4.14 It should be noted the criteria differ from the methodology proposed in **Chapter 2**. The methodology proposed in this chapter is based on professional judgement and completion of numerous ES chapters for solar generation projects in the absence of formal guidance or advice.

Table 6.4: Significance Criteria

		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Magnitude of Change	High -Negative	Major adverse	Major adverse	Moderate adverse	Negligible
	Medium - Negative	Major adverse	Moderate adverse	Minor Adverse	Negligible
	Low – Negative	Moderate adverse	Minor adverse	Minor adverse	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible
	Low – Beneficial	Moderate Beneficial	Minor Beneficial	Minor Beneficial	Negligible
	Medium - Beneficial	Major Beneficial	Moderate Beneficial	Minor Beneficial	Negligible
	High - Beneficial	Major Beneficial	Major Beneficial	Moderate	Negligible

Limitations



- 6.4.15 Detailed information about the condition of the soil and geology on the Site was not available, for example **Chapter 9** used desk-based information, and consequently the assessment of the hydrological response to rainfall is based on freely available datasets on soil and geology and Site observations.
- 6.4.16 Hydraulic modelling work carried out for the Site which is reliant on the baseline models and although these have been checked for any obvious errors or issues, it is presumed these are fit for purpose as they were supplied by NRW.
- 6.4.17 The impacts on groundwater quality have not been assessed in this chapter but are included within **Chapter 10** of this ES.

6.5 Baseline Conditions

- 6.5.0 It is important to assess the Study Area holistically to demonstrate that impacts arising from the Proposed Development would not significantly impact the water environment in the Study Area. Therefore, this section describes the baseline condition of the Study Area, making reference to specific parts of the area where relevant (for example the Solar Site).
- 6.5.1 The Site is currently agricultural land, which is understood to be a mix of pasture and arable uses. The Cable Corridor follows field boundaries, existing tracks, existing roads and is predominantly along adopted highways, wherever possible.
- 6.5.2 Furthermore, the underground electrical cables would be a buried service. Therefore, subject to appropriate crossing of watercourses, it would not impact the flow or movement of water and has consequently been excluded from the scope of this assessment.
- 6.5.3 The majority of the Solar Site is on low-lying and flat ground, with levels being approximately 4 – 4.2 m above ordnance datum (AOD). Land starts to rise in a band along the southern boundaries of the Solar Site parcels located to the south of the A547, reaching between 5.5 m – 6.5 m AOD. The BESS Site is located at a much higher elevation, at approximately 48 m AOD.
- 6.5.4 The lower parts of the Solar Site are characterised by a network of watercourses, including NRW Main Rivers. Based on the review of reports provided by NRW (Afon Gele Flood Risk Review, Pensarn Flood Risk Study Report, Point of Ayr to Pensarn Report, River Dove Strategic Flood Risk Mapping Report and the St Asaph Flood Risk Management Scheme report) It is understood this watercourse network assists with the drainage of agricultural fields and is managed by a system of sluices, pumps and diversion channels.
- 6.5.5 As also reported in **Chapter 10**, the watercourses in the Solar Site are a mix of wet and dry ditches, with the wet ditches containing water for the majority of the year. The dry ditches are those that are more ephemeral and become dry during dry weather.
- 6.5.6 The principal Main Rivers that flow through the Study Area are the Afon Gele and associated Bodoryn Cut, the Glan Y Morfa Drain, Bodelwyddan Main Drain, St Georges Meadow Drain, Coed Y Drive Drain and Glan Y Gors Drain.
- 6.5.7 For the WFD classification, the Solar Site lies within the Western Wales River Basin District, Clwyd Management Catchment, Gele Operational Catchment and Gele waterbody area. The BESS Site lies in the same Management Catchment, and it also lies in the Pont Robin Cut (Bodelwyddan) waterbody area.
- 6.5.8 The Gele waterbody is classed as being heavily modified due to its assistance with drainage of agricultural land. It has an overall Moderate status. Its ecological status is Moderate and chemical status High. The driving elements behind these classifications are dissolved oxygen and phosphorus which are classified as being Poor.
- 6.5.9 The Pont Robin Cut (Bodelwyddan) waterbody has an overall Poor status, with Poor ecological status and High chemical status. The driving elements behind these classifications are invertebrates, which are classified as being Poor.



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- 6.5.10 According to the WFD Cycle 3 data, diffuse sources from agriculture and rural land management are major Reasons For Not Achieving Good (RNAG) status.
- 6.5.11 In addition, the Site is located within an area with a Woodland Opportunity Map (WOM) 21 score of 4, indicating the WFD status of the water bodies is likely to be influenced by agricultural run-off.
- 6.5.12 Regarding groundwater, the Site (Solar and BESS Site) falls entirely within the Clwyd Permo-Triassic Sandstone groundwater area. This has an overall water body status of Good, with the groundwater quantity status also being Good. It should be noted the impact on groundwater quality is discussed in **Chapter 10** of this ES.
- 6.5.13 The Proposed Development will be the subject of a WFD Screening and Scoping assessment. If likely significant impacts are identified through this process, a full assessment will be completed. The WFD assessment process would utilise NRW templates and guidance.
- 6.5.14 The majority of the Solar Site falls within Flood Zone 3. There is a limited area of land at the southern boundary adjacent to the A547 which is classified as Flood Zone 2. A very small part of the Solar Site is designated as Flood Zone 1. This is land which is above approximately 6.7 m AOD at the far southern edge of the Solar Site. This means it is an area of floodplain that benefits from the presence of flood defences as per the operational solar farm consented in 2015 (described in Paragraph 2.1.3 of Chapter 2), adjacent to the Solar Site, which was not EIA development (LPA ref, ENQ/23841).
- 6.5.15 The BESS Site is located in Flood Zone 1; therefore, it is at little or no risk of flooding from main rivers or the sea.
- 6.5.16 The Solar Site parcels located to the south of the A547 fall within an area of 'Low' risk of flooding from rivers, meaning they are at risk from a present day 1 in 1,000 year defended event. Of the parcels to the north of the A547, only part of the westernmost parcel falls within an area of 'Low' risk.
- 6.5.17 Only very small parts of the BESS Site fall within areas predicted to be at risk from surface water and small watercourses flooding, based on NRW mapping of the Flood Risk from Surface Water and Small Watercourses. The majority of these are likely to be associated with field perimeter ditches, which may not be fully represented by the simulation modelling represented in the mapping. The remaining areas are minor depressions in the land so depths would not be significant.
- 6.5.18 There are three known flood modelling studies in the vicinity of the Site that either augment or provide the above mapped flood risk. The models are the St Asaph Model (fluvial), the Point of Ayr to Pensarn Model (tidal) and the Afon Gele Model.
- 6.5.19 The St Asaph Model predicts the Site to be flood-free during the 1 in 100-year event, when accounting for defences. However, almost all of the Site south of the A457 is predicted to be at risk during the 1 in 1,000-year event.
- 6.5.20 When accounting for defences, the Point of Ayr to Pensarn Model predicts the Site to be flood free during the 1 in 200-year event.
- 6.5.21 According to NRW's Surface Water and Small Watercourses flood map, significant parts of the parcels south of the A547 are predicted to be inundated during a Low-risk event, during a 1 in 1,000-year event. North of the A547 the extents are smaller. It should be noted that due to its strategic scale, this mapping often misrepresents smaller watercourses as well as control structures, culverts, crossings, sluices or pumps. Therefore, it is likely that the risk of surface water and fluvial flooding posed to the Site is better represented by the flood modelling studies noted at paragraph 6.5.4 above.
- 6.5.22 Outside the above, the Site contains a network of watercourses to assist with the drainage of agricultural fields.



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- 6.5.23 British Geological Survey data shows most of the Site, including the BESS Site, to be underlain by Warwickshire Group bedrock geology – a mudstone, siltstone and sandstone. The far northeastern parcels are underlain by Kinnerton Sandstone Formation. The Cable Corridor predominantly runs through an area of Clwyd Group Limestone.
- 6.5.24 The low-lying parts of the Site, i.e. the vast majority of the Solar Site, are underlain by tidal flat superficial deposits, comprising clay, silt and sand. As the Site rises, it is underlain by Till, Devensian – Diamiction superficial deposits. This means only the southern edges of the Solar Site are underlain by Till, but the entire BESS Site and Cable Corridor are underlain by such.
- 6.5.25 BGS data demonstrates that the aquifer designation matches the bedrock, with the areas of sandstone bedrock being classified as a ‘Highly Productive Aquifer’, with the mudstone, siltstone and sandstone as well as the limestone being a ‘Moderately Productive Aquifer’.
- 6.5.26 Cranfield Soil and Agrifood ‘Soilscapes’ online mapping¹⁶ shows soils at the Solar Site to have seasonally wet soils with impeded drainage or be naturally wet with high groundwater. The Cable Corridor and BESS Site are underlain by ‘*Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils*’ with impeded drainage.
- 6.5.27 According to the BGS Soil Parent Material Model mapping¹⁷ the Solar Site lies in an area of Quaternary Estuarine soils with a clay to silt texture, which are defined as ‘heavy’ and ‘deep’. The ‘deep’ classification is the deepest of the groups, where soils are able to be dug to at least 1m. ‘Heavy’ is the heaviest of the groups, denoting heavy clay soils.
- 6.5.28 The Cable Corridor and the BESS Site fall within an area of Glacial Till, which is, according to the Soil Parent Material Model, loam to clayey loam, classified as ‘deep’ and ‘medium to light (silty) to heavy’.
- 6.5.29 The Site is not located within a Source Protection Zone but does fall within a groundwater Nitrate Vulnerable Zone (NZV).

Baseline Evolution

- 6.5.30 From a flood risk and water quality perspective, the Proposed Development activities are assessed in this Chapter and the FCA (**Appendix B.1**) against the future baseline, inclusive of climate change. Therefore, the assessment is based on the flood risk profile at the end of the anticipated lifetime of the Proposed Development, which is 40 years.
- 6.5.31 It is presumed the existing land use would, without the Proposed Development being in place, remain as per existing and therefore the RNAG WFD status would similarly remain as existing.
- 6.5.32 Regarding fluvial flows, the Site falls within the West Wales River Basin District. In accordance with Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales¹⁸ (‘the Guidance’), fluvial flows would increase between 40% (upper climate change estimate) or 20% (central estimate) over the lifetime of the Proposed Development (2050s epoch).
- 6.5.33 Consequently, the relevant uplift to river flows for the Site would be 20%.

¹⁶ Landis (2025) Soilscapes Viewer <https://www.landis.org.uk/soilscapes/>

¹⁷ British Geological Survey (2025). Soil Parent Material Model. Available via https://osdatahub.os.uk/downloads/open/Soil_Parent_Material_Model_1km

¹⁸ Welsh Government (2022), Adapting to Climate Change - Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales.. https://www.gov.wales/sites/default/files/publications/2022-11/guidance-for-flood-and-coastal-erosion-risk-management-authorities-in-wales_0.pdf



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- 6.5.34 As with all areas in Wales, rainfall would increase between 20% (upper estimate) and 10% (central estimate). The guidance states that *'As a minimum, development proposals should be assessed against the central estimate to inform design levels'* and *'Drainage systems should be designed to ensure there is no increase in site run-off when assessed against the upper estimate'*.
- 6.5.35 As a result, the relevant surface water drainage assessments for the Proposed Development would use the upper scenario (+20%) to promote a conservative assessment and for consistency with the fluvial flows uplift.
- 6.5.36 The Guidance also provides allowances for sea level relative to a 1981-2000 baseline by local authority area. For Denbighshire the sea level rise estimates for 2100 are 0.75 m for the 70th percentile and 0.95m for the 95th percentile. For 2120 they increase to 0.98 m and 1.29 m respectively.
- 6.5.37 Within Annex 2 of the Guidance, it is advised that sea-level rise can be taken from the quoted values in Table 4 of the Guidance or otherwise site-specific values can be obtained directly from the United Kingdom Climate Projections 2018 (UKCP18) interface. It also states that the 70th percentile (higher central) should be used as a 'design allowance' and the 95th percentile (upper end) should be used in 'sensitivity planning'.
- 6.5.38 To understand the impact on sea level rise Coastal Flood Boundary data was downloaded from the UKCP18 for nodes _1126, _1134, for the RCP8.5 (the very high future emissions, which presumes that by the end of the century emissions will be three times higher than at present) scenario.
- 6.5.39 According to the Coastal Flood Boundary dataset, sea level rise to 2070 is predicted to be between 0.36 m to 0.48 m less than in 2100, depending on the climate change scenario applied.
- 6.5.40 The St Asaph model predicts that the Solar Site (noting the elevation of the BESS Site) is not at risk during a 1 in 100 year +30% fluvial event when accounting for defences.
- 6.5.41 The Point of Ayr to Pensam Model includes a model run that predicts flooding in the year 2067 for the 1 in 200-year tidal event, which is considered to represent the design event for the Proposed Development. This shows the Site to be flood free when accounting for the presence of defences.
- 6.5.42 The Point of Ayr to Pensam Model also simulated the impact of a breach in the defences coinciding with a design flood event. However, these were only conducted for the years 2097 and 2122, beyond the anticipated lifetime of the Proposed Development. Therefore, additional breach modelling has been completed to support the Proposed Development and estimate the potential flooding impacts at the end of the Site lifetime.
- 6.5.43 The additional modelling was completed for the year 2070, 70th and 95th percentiles. In accordance with TAN15 and NRW requirements, the breach event in 2070 is considered a design event. This shows that the majority of the Solar Site would, in the more conservative 95th percentile scenario be flooded to varying depths but are generally less than 1 m with areas up to 1.2 m.
- 6.5.44 A full explanation of the flood risk posed to the Site is provided in the Flood Consequence Assessment (**Appendix B.1**).

Derivation of Sensitivity

- 6.5.45 In summary, the ground conditions beneath the Site vary but there is a 'Highly productive aquifer' beneath much of the Solar Site, albeit not located within a Source Protection Zone. With the WFD status being 'Good', however, and in order to adopt a precautionary approach, using the criteria in **Table 6.2**, the groundwater resource is assessed as having a **Medium** sensitivity.



- 6.5.46 Regarding surface waters, their WFD status is 'Poor'. However, the watercourses are known to perform an important drainage and water management function. Consequently, and taking a precautionary approach as per **Table 6.2**, the surface waters in the Study Area are assessed as having a **Medium** sensitivity.
- 6.5.47 Regarding flood risk, given the Solar Site lies in an area of managed watercourses, despite the mostly defended nature of the Site, taking a precautionary approach as per **Table 6.2**, the surface waters in the Study Area are assessed as having a **Medium** sensitivity.

6.6 Primary and Tertiary Mitigation

Inherent Mitigation

- 6.6.0 It is well documented that the transition from the arable farmed land (such as that within the Solar Site) to solar farm with year-round grass cover would result in betterment in terms of soil health and therefore percolation would be improved, and soil erosion and runoff would be reduced. This is explained in detail in the FCA (**Appendix B.1**). Therefore, inherently, the Proposed Development would likely result in betterment of the Site. However, some measures are required to be embedded within the design to mitigate flooding without negatively impacting third parties. Specific measures include:

- Locate the BESS and substation compounds in an elevated position within Flood Zone 1;
- Utilise tracker panels that, when stowed (their default position), their water sensitive parts would be above the predicted defended 1 in 1,000-year levels as well as the breach flood depths. Therefore, the panels would be at least 1.1 m above the ground, or higher (1.52 m or 2.17 m) where breach levels are deeper;
- Utilise Per- and Polyfluorinated Substances (PFAS)-free panels to negate release of contaminants in rainwater falling on them;
- Locate water-sensitive equipment (for example, inverters and substations) outside of design flood extents and raise above breach levels, where possible;
- Where water-sensitive equipment needs to be located in a design flood extent, raise it by 500 mm to raise it above the future defended 1 in 1,000 year tidal and 1 in 100-year fluvial flood events. To be raised using pads or plinths to maintain the flow of water across the Site;
- Subject to procurement and design processes, use watertight containers where inverters are located within areas of modelled breach flooding;
- Where possible, disperse 'hardstanding' (for example, inverters) across the Site and locate it on gravel bases to cleanse rainwater runoff before encouraging it to ground, mimicking the existing Site.
- Wrap the gravel bases in permeable textiles to provide an additional layer of filtration and protect the gravel bases from entry of fines, whilst facilitating infiltration;
- Utilise a drainage strategy for the BESS compound;
- Locate all built infrastructure at least 8 m from Main Rivers (watercourses that fall under the jurisdiction of NRW, noting that Chapter 10 recommends a buffer of 10m for the Bodoryn Cut) or 5 m from Ordinary Watercourses (watercourses under the jurisdiction of the Lead Local Flood Authority); and
- Ensure watercourse easements are grassed to act as a buffer for runoff and absorb residual sediment before entering the watercourse (noting this would be low with the other embedded measures).



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- 6.6.1 With BESS installations, it is important to consider if there is a risk to the water environment following a BESS fire outbreak. This assessment, and mitigation referred to in this section, has been compiled alongside the Outline Battery Safety Management Plan (OBSMP), document reference ARC-1259-002-R1.
- 6.6.2 The most notable mitigation at the Site will be to use watertight containers fabricated in accordance with Ingress Protection 68 standards. This would mean that in the event of a fire, it is highly likely that contaminants discharged would settle locally within the battery unit and not be released externally.
- 6.6.3 Temperature and humidity within the batteries is controlled to avoid excessive heat that could cause breakdowns. This is managed through application of an air or liquid cooling system.
- 6.6.4 As described in the OBSMP, the batteries are housed in a container with an Environmental Control Unit (ECU). The ECU maintains the temperature and humidity in the container, allowing batteries to operate in their optimum conditions. In addition, the batteries would be fitted with a Battery Management System (BMS). The BMS is a multi-layered system that is able to shut down at cell, module or rack level if temperatures rise in the units.
- 6.6.5 An automated fire suppression system would exist within the BESS units. A clean (i.e., non-toxic, PFAS-free substances), non-water based, suppression system is preferred as this eliminates the need for internal storage, and use, of significant volumes of water.

Primary Mitigation

Construction

- 6.6.6 As described above, the Solar Site is characterised by land that is very gently sloping. This would provide the initial mitigation against runoff, soil erosion or similar in that such impacts are less pronounced on gently sloping land. For example, wheel ruts or similar would tend to fill with water and sediment before draining into the soil, rather than cause significant flow paths for erosion or scour. Nonetheless, mitigation is proposed to reduce the source or pathway of such effects.
- 6.6.7 Construction compounds are proposed to be located outside areas predicted to be at risk of present day defended flooding to significantly reduce the impact on site operations if flooding were to occur. This would also minimise the risk of pollutants entering floodwater.
- 6.6.8 Likewise, stockpiling of materials (if required) would be located outside of areas of defended flooding and at least 8 m from the top of bank of all watercourses and 10m from the Bodoryn Cut, wherever possible.
- 6.6.9 The construction compounds would be formed from permeable gravel (or similar) material, which would allow water to percolate into the ground as per the existing situation and thus negate impacts on local drainage. Permeable gravel also acts as a filtration substrate to clean water passing through it. The compound would include a lay-down area for deliveries and be located close to an existing highway, which would minimise the movements across the Site and therefore potential impact on drainage, soil erosion, compaction and pollution.
- 6.6.10 The panels themselves would be the most significant infrastructure across the Site. They would be constructed by piling the stanchions into the ground without the need for significant earthworks. This would allow the movement of surface and sub-surface water to continue across the Site.
- 6.6.11 The location of more vulnerable infrastructure, notably the substation on the BESS Site, has accounted for flood risk but locating these outside of areas of predicted flood risk, wherever possible.



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- 6.6.12 Where this is not possible, any containerised infrastructure would be raised on pads or plinths, so they are 500mm above the ground and, where possible, be watertight to prevent them flooding in a design breach event.
- 6.6.13 It has been recommended in the FCA (**Appendix B.1**) that the potential flood risk and drainage effects of the construction stage of the Proposed Development are considered as part of a CEMP. (**Appendix A.5**)
- 6.6.14 Precautions would be taken in any areas where there is increased risk of hydrocarbon/chemical spillage. Any relevant fuels, lubricants or chemicals would be stored in accordance with the appropriate NRW Technical Guidance Notes with an impermeable base and suitable bunding to prevent discharge.
- 6.6.15 Access routes would utilise or enhance existing watercourse crossings wherever possible, and a review of the submitted Proposed Solar Layout (**Appendix A.9**) shows this is the case.
- 6.6.16 In accordance with NRW and LLFA requirements, no infrastructure will be located within at least 8 m of the top of the bank of a Main River and 5 m from Ordinary Watercourses. This will allow a buffer strip between all development and the watercourses to help absorb pollutants or sediment in the extremely unlikely event of a spillage or erosion event.
- 6.6.17 In summary, the primary mitigation during construction would be:
- Utilise driven piling for the panel stanchions to minimise soil disruption;
 - Construct, and utilise, permeable access tracks, lay down areas and compounds early in the construction programme;
 - Planting of riparian vegetation early in the construction programme;
 - Limit the need for hydrocarbons, chemicals and pollutants and therefore storage of such. Where required, use appropriate storage of such in accordance with NRW Technical Guidance Notes, such as through the use of impermeable bases;
 - Where land drains are damaged, record and geolocate them for potential restoration to reduce the chance of creating a sediment pathway;
 - Use of Horizontal Directional Drilling (HDD) or trellising for cable route crossing;
 - Prioritise the use, or upgrade, of existing crossings over proposing new crossings; and
 - Where new crossings are required or existing crossings need to be upgraded, utilise structures with larger cross-sectional area, include a mammal shelf and include bed substrate similar to the watercourse local to the structure.

Operation

- 6.6.18 During operation, the Proposed Development would include the below measures to negate any perceived negative impacts arising and maximise benefits of the Proposed Development:
- The transition of the arable farmed land within the Solar Site to solar farm with year-round grass cover would result in betterment in terms of runoff, soil erosion and therefore sediment entering surface waters;
 - Battery, inverter and storage containers, which are spread across the Site, would be sited on gravel beds 0.3 m deep allowing for distribution of runoff and infiltration into the ground below, minimising the potential increase in surface water runoff; and



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- No maintenance access during flooded conditions to maximise the safety of operatives and recognising the remote operation of the Site.
- 6.6.19 The management of runoff from the BESS Site would require mitigation for during both design rainfall conditions as well as in the very unlikely event of fire breakout.
- 6.6.20 As described in the FCA (**Appendix B.1**), the Proposed Development would utilise a drainage strategy for the BESS Site to limit rainfall discharges as close to equivalent greenfield “QBar” rates as closely as possible.
- 6.6.21 This would follow a SuDS approach to cleanse runoff, in accordance with the Construction Industry Research and Information Association (CIRIA) SuDS Manual.
- 6.6.22 Ignoring drainage implications, the BESS Site would be constructed on a compacted gravel base that would be approximately 300 mm – 500 mm deep. Therefore, for efficiency and to limit the groundworks during construction, it is proposed to utilise this gravel base for the drainage strategy.
- 6.6.23 To control design rainfall, it is proposed to wrap the gravel base in an impermeable membrane and allow the gravel to act as the attenuation storage medium. This would discharge at equivalent QBar rates to the nearby watercourse network, with flows restricted by a flow control device and the attenuation gravel base sized accordingly.
- 6.6.24 The flow control chamber would be fitted with a penstock to allow it to be fully sealed in the event of a fire breakout that would require the fire and rescue services to commence suppression spraying.
- 6.6.25 Suppression spraying would likely focus either on keeping adjacent units cool to prevent the spread of a fire or to bring the smoke plume to ground. The latter would depend on conditions on the day in terms of wind and the density of the plume.
- 6.6.26 The sealed penstock would prevent discharge to the watercourse network until such time that the water would be tested for contaminants. The gravel base would provide sufficient capacity for at least 6-hours of ‘fog nozzle’ spraying with no discharge, which should be sufficient time for the fire service to commence pumping out contaminated water and disposing of it appropriately, such as via licenced waste disposal.
- 6.6.27 If spraying is required to bring the smoke plume to ground, settled water would fall on the gravel bases surrounding the BESS unit. The gravel would be limestone-based, which would neutralise diluted acids such as hydrofluoric acid (HF) in the event this is released. Nonetheless, the calcium carbonate content of the limestone¹⁹ gravel would neutralise acid in the suppression water, particularly given its dilute nature.
- 6.6.28 The maintenance of drainage features would be essential so that the surface water drainage system operates effectively. Maintenance activities would include:
- Regular inspections of downpipes and gravel bases;
 - Removal of sediment – if required following inspections inspection; and
 - Repair damaged membranes.
- 6.6.29 During operation, the Proposed Development would be remotely operated. The Proposed Development operation would be supported by a Flood Emergency Plan. Given the design, flood conditions at the Site would be well forecasted and it would be reasonable to presume

¹⁹ Honeywell (2014) Typical Alkline Materials (Bases) for Neutralization [sic] of HF. <https://prod-edam.honeywell.com/content/dam/honeywell-edam/pmt/oneam/en-us/hydrofluoric-acid/honeywell-bases-for-neutralization-of-HF-v2.pdf>



that entry to the Site by operatives would be prevented until the flood warning was removed or flood conditions abated.

Decommissioning

6.6.30 As with construction, the most likely impacts arising during decommissioning would be similar to those during construction in terms of soil erosion, compaction and runoff. Therefore, the primary mitigation during decommissioning would be similar to that during construction in terms of promoting good site management practices. In summary, the key mitigation would be:

- Temporary compounds to be formed from permeable surfacing;
- Retain riparian vegetation for the duration of decommissioning activities;
- Limit the need for hydrocarbons, chemicals and pollutants and therefore storage of such. Where required, use appropriate storage of such in accordance with NRW Technical Guidance Notes, such as through the use of impermeable bases;
- Replace any damaged land drains;
- Retain cables across watercourses to limit riparian or in-channel works.

Tertiary Mitigation

6.6.31 The main form of tertiary mitigation would be the CEMP , DEMP and outline Battery Safety Management Plan (BSMP).

6.6.32 These documents would embed any additional mitigation required to minimise impacts on the water environment.

Construction

6.6.33 The outline CEMP (**Appendix A.5**) includes measures to mitigate the risk of increased runoff during the construction phase of the Proposed Development such as:

- Locate construction compounds outside areas at risk of flooding, wherever possible;
- If stockpiles are required, lay them on geogrid, membranes or similar and locate them outside design flood extents wherever possible;
- The use of permeable materials for construction or lay-down areas;
- Constructing and using access tracks early in the programme;
- Planting riparian vegetation early in the programme, where reasonably practicable;
- Appropriate storage of hydrocarbons and other pollutants to reduce the chance for accidental spillage or reduce the chance for entry to water bodies;
- Appropriate pollution prevention such as storage of chemicals on bunded impermeable surfaces, provision of spill kits for rapid clean up;
- Time construction for dry conditions, i.e. between April and October, wherever possible;
- Use of low-pressure tyres to limit compaction;
- Use of tillage, tining, or similar, to break up compacted or rutted soils; and



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- Recording of damaged land drains to allow them to be restored during decommissioning if required.
- 6.6.34 The construction will also be supported by an outline Soil Management Plan (oSMP, **Appendix I.5**), which details and secures measures to manage soil compaction. An Outline Soil Management Plan (oSMP) accompanies the Application.
- 6.6.35 According to the oSMP, laying of cables would likely utilise shallow trenching, with a likely maximum depth of 1.2m but typically shallower than this, depending on the soil composition. Trenching would follow the BRE Agricultural Good Practice Guidance for Solar Farms and be limited to dry periods (April to October) where possible.
- 6.6.36 The creation of enhanced, wet or widened ditches would only select ditches where the widening wouldn't impact the watercourse easements described in paragraph 6.6.17. To create the enhanced ditches would require excavation. This would occur when the ditches were dry. The excavation would be from the centre of the ditch outwards, leaving the end as 'plugs' preventing ingress of water to the enhanced ditch. The 'plugs' would to be carefully removed once vegetation in the enhanced ditch has established. Once vegetation is established, the 'plugs' would then be carefully removed so as to limit the velocity of water flowing into the ditch. This would mitigate potential for erosion. Material removed from the ditch would be treated appropriately, for example, spread across the Solar Site given it would likely be fertile.
- 6.6.37 The Cable Corridor follows existing roads wherever possible to limit impacts associated with excavation.
- 6.6.38 Cable crossings across watercourses would use Horizontal Directional Drilling (HDD) or trellising to minimise the impact on the watercourse morphology.
- 6.6.39 As with watercourse vehicular crossings, the specific location, depth, length and methodology of cable crossings is currently unknown as it is subject to detailed investigation and survey of existing crossings. Similarly, the programme for installing the crossing cannot be known until a contractor is appointed, outside of the DNS process.
- 6.6.40 It is possible that localised dewatering is required. This would very much depend on the time of year the cabling is installed and the specific geological conditions of buried (non-trellised) crossing location, which will only be confirmed following detailed surveys and on receipt of the contractor's programme.
- 6.6.41 In order to inform this assessment, it is presumed that groundwater dewatering would be non-consumptive and localised.

Operation

- 6.6.42 As explained in Section 6.7 below, with the primary mitigation in place, the Proposed Development would result in no **significant negative** effects during operation and therefore no additional mitigation is required.
- 6.6.43 As reporting in **Chapter 10**, it is proposed to enhance some ditches by wetting or widening them, subject to consultation with NRW and relevant consents. This would likely provide biodiversity benefits (as described and assessed in **Chapter 10**) but also potential benefits to the capacity of the ditch network and therefore reduction in flood risk. Such benefits would most likely be recognised in lower magnitude events than the design events assessed by the FCA (**Appendix B.1**).

Decommissioning

- 6.6.44 Similar to construction, the tertiary mitigation during decommissioning would be as per the DEMP, summarised as follows:



- Locate compounds outside areas at risk of flooding, wherever possible;
- If stockpiles are required, lay them on geogrid, membranes or similar and locate them outside design flood extents wherever possible;
- The use of permeable materials for construction or lay-down areas;
- Utilise access tracks until late in the programme;
- Programme works for the drier season (April to October);
- Retain riparian vegetation in situ;
- Appropriate storage of hydrocarbons and other pollutants to reduce the chance for accidental spillage and reduce the chance for entry to water bodies;
- Appropriate pollution prevention such as storage of chemicals on bunded impermeable surfaces, provision of spill kits for rapid clean up;
- Use of low-pressure tyres to limit compaction;
- Use of tillage, tining or similar, to break up compacted soils; and
- Respiration of damaged land drains.

6.7 Assessment of Significant Likely Effects

Construction and Decommissioning

- 6.7.0 The two potential receptors during the construction phase would be surface water or groundwater. Following the criteria in **Table 6.2** and comparing this with the baseline data, the sensitivity of both of these receptors is assessed as being **Medium**.
- 6.7.1 All impacts in the construction phase would be temporary and persist for the duration of construction only and consequently be less than two years.
- 6.7.2 In accordance with the criteria in **Table 6.3**, with the proposed mitigation in place, the risk of increased runoff and soil erosion as a result of construction activities, notably soil compaction, would be considered as Negligible. This would result in an overall significance of effect (based on **Table 6.4**) of **Negligible** and therefore **Not Significant** using the criteria in **Table 6.3**.
- 6.7.3 The mobilisation of sediment or contaminants to the groundwater resource would be minimised by the presence of deep, low permeability soils and the route following existing roads where possible. In accordance with **Table 6.3**, the risk to groundwater is therefore Low-negative and consequently in accordance with **Table 6.4**, would have a **Minor Adverse** significance and therefore **Not Significant** using the criteria in **Table 6.3**.
- 6.7.4 Existing vehicular watercourses crossings would be utilised. Therefore, the risk posed to watercourses from vehicular access crossings would, with the mitigation in place, result in a Negligible impact on the local watercourses. In accordance with **Table 6.4**, this impact would have a **Negligible** significance and therefore **Not Significant** using the criteria in **Table 6.3**.
- 6.7.5 There would be relatively limited volumes of chemicals or hydrocarbons stored on the Site. Given the mitigation proposed, notably adhering to NRW Technical Guidance Notes and the measures in the approved CEMP, the impact on the water environment from spills or accidents would be Negligible. In accordance with **Table 6.4**, this impact would have a **Negligible** significance and therefore **Not Significant** using the criteria in **Table 6.3**.



- 6.7.6 Cable crossings would be trellised or via HDD. Either way, with the mitigation in place, the impact from the cable laying would, in accordance with the criteria in **Table 6.3** would be Low negative and short term. In accordance with **Table 6.4**, this impact would have a **Minor** significance and therefore **Not Significant** using the criteria in **Table 6.3**.

Operational

- 6.7.7 Effects to the Site during operation would, unless otherwise stated, be considered long term.
- 6.7.8 Across the Site, the cessation of agricultural activities would have beneficial effects in terms of runoff rates and water quality. Stocking densities of grazing animals would be generally reduced as would the use of agricultural machinery, leading to less ground compaction. The reduction in the application of herbicides and fertilisers would also result in a reduction of pollution of groundwater and surface water resources.
- 6.7.9 The Proposed Development would allow the establishment of a healthy soil ecosystem, an increase in organic matter content, and associated improvements in soil structure, especially in areas which were formally ploughed and left to bare earth following harvest, and those areas where overgrazing and trafficking has caused compaction and erosion. The solar panels would also protect the ground from intense rainfall whilst vegetation is becoming established and should reduce the formation of surface crusts.
- 6.7.10 The sensitivity of the receptor in terms of surface water, groundwater and flood risk is assessed as being Medium. When compared with the existing land use, the Magnitude of Change in runoff and soil erosion potential is considered to be Low – Beneficial. The significance of the change of land use on pollution is therefore considered to be **Minor Beneficial**.
- 6.7.11 The mitigation regarding the management of rainfall will, for the isolated containerised infrastructure and permeable substation, encourage water to ground locally to the infrastructure, mimicking the existing Site conditions. Where a concentration of hardstanding is proposed, notably the BESS Site, a formal drainage strategy is proposed that would limit discharges as low as is feasibly possible. The use of gravel bases in both cases would provide sufficient cleansing of rainwater. Consequently, the impact on runoff and therefore flood risk would be Negligible. In accordance with **Table 6.4**, this impact would have a **Negligible** significance.
- 6.7.12 Regarding BESS and fire risk, the chances for ignition are incredibly low and below HSE acceptable standards. Nonetheless, the design, installation and operation of BESS units would follow the Health and Safety Executive's hierarchy of controls – elimination; substitution; engineering controls; administrative controls; and personal protective equipment. This would result in mitigation of fire risk being embedded at multiple levels within the battery design and installation.
- 6.7.13 It should be noted that as of April 2025, there are approximately 132 operational BESS (XGW) sites across the UK²⁰.
- 6.7.14 Since 2006, UK BESS installations have accumulated approximately 800 years of operation, with only two reported failures due to fire at Carnegie Road in Liverpool (2020) and East Tilbury (2025). This relates to a failure per hour (fph) rate of approximately 1×10^{-7} fph (0.00000014fph) which is incredibly low. Nevertheless, these incidents prompted a thorough scientific review and significant improvements in BESS technology including new safety measures and guidance.

²⁰ Department for Energy Security and Net Zero, 2025. Renewable Energy Planning Database. Available via <https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract>



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- 6.7.15 Within the Health and Safety Executive (HSE) Reducing Risks, Protecting People guidance²¹, a 1×10^{-6} fph (0.000001fph) rate is proposed as a '*socially acceptable*' safety rate for the public. The fph for batteries is a factor of 10 lower than this socially acceptable rate. Consequently, the risk of ignition would not be deemed to be 'unacceptable'.
- 6.7.16 To date, there have been and there has been no recorded damage to third parties or the environment as a result of a BESS fire in the UK.
- 6.7.17 For example, the Merseyside Fire and Rescue Service Significant Incident Response²² reported that during the Carnegie Road incident runoff was regularly tested and did not record acidic conditions.
- 6.7.18 In addition, of the few BESS fires worldwide, the clearest evidence relating to monitoring of contaminants in a smoke plume is the Moss Landing Vistra Battery Fire in California, USA²³. The recording of this incident demonstrated no elevated levels of contaminants in the smoke plume, meaning that, based on this evidence, it is unlikely that the mobilisation of contaminants to the water environment from the smoke plume is also unlikely.
- 6.7.19 Regarding BESS fire management, the evidence presented above demonstrates that the risk of ignition is incredibly low and there is no known evidence that fires release significant quantities of contaminants, either in runoff or airborne. Therefore, with the mitigation in place, the risk to the water environment from a battery fire is Negligible. In accordance with **Table 6.4**, this impact would have a **Negligible** significance.
- 6.7.20 The main part of the Solar Site would be taken up by solar panels, which are considered to have a Negligible effect on runoff rates. Rows of solar panels would be separated by gaps and the solar arrays themselves have thermal expansion gaps. The concentration of runoff from the solar panels would therefore be spatially localised, draining between the expansion gaps.
- 6.7.21 Once rainfall has exceeded the interception capacity of vegetation it would initially take up any available depression storage and soil moisture deficit before moving laterally through the soil and percolating downwards. If the incident rainfall exceeds the rate of soakage into the ground, it would move laterally above the soil and soak into areas which are within the 'rain shadow' of the panels.
- 6.7.22 The velocity of water falling from the panels would be significantly less than the velocity of unimpeded rainfall. Soils would therefore be less susceptible to erosion.
- 6.7.23 The above means that the potential for increased runoff from the panels would be Negligible. In accordance with **Table 6.4**, this impact would have a **Negligible** significance and therefore Not Significant using the criteria in **Table 6.3**.
- 6.7.24 Where located in areas of risk, the panels would be raised so that when in their default stowed position, they would be raised at least above the predicted flood levels, including the present day 1 in 1,000 year and the future (2070) 1 in 200-year breach flood event. This would mean they remain operational during all assessed flood conditions. The stanchions of the panels would occupy a negligible area meaning a de minimis impact on floodplain displacement. Taking a precautionary approach to the criteria in **Table 6.3**, this would have a Low – Negative magnitude. Following the criteria in **Table 6.4**, given the Medium sensitivity of flood risk, this

²¹ Health and Safety Executive (2001). Reducing Risks, Protecting People https://assets.publishing.service.gov.uk/media/6693ad9e49b9c0597fdafc36/1Q8.10.J_Document_9_Health_and_Safety_Executive_Reducing_risks_protecting_people_HSE_s_decision-making_process_2001.pdf

²² Merseyside Fire and Rescue Service (2020). Significant Incident Report. <https://hawkchurchactiongroup.com/wp-content/uploads/2022/04/BESS-Fire-Significant-Incident-Report.pdf>

²³ United States Environmental Protection Agency (2025) EPA Completes Air Monitoring near Moss Landing Vistra Battery Fire. <https://www.epa.gov/newsreleases/epa-completes-air-monitoring-near-moss-landing-vistra-battery-fire#:~:text=EPA%20Completes%20Air%20Monitoring%20Near%20Moss%20Landing%20Vistra%20Battery%20Fire,-Emergency%20Response%20%2D%2D&text=MONTEREY%E2%80%9494%20On%20January%202020%2C%20the,fire%20in%20Moss%20Landing%2C%20CA.>



would have a Minor significance. Following the criteria in **Table 6.4**, this would have a **Minor** significance and therefore **Not Significant** using the criteria in **Table 6.3**.

6.7.25 During a residual flood event either during a breach coinciding with a design event (1 in 200 year in 2070) or a future (2067) 1 in 1,000-year event, flooding could reach the isolated containers. These events have a very low likelihood of occurring but have the potential to impact the operation of the containerised infrastructure. However, such an impact would be short term and temporary until such time as the units could become operational. Such flooding would not impact third parties through displacement or similar. As a result, the impact has, using the criteria in **Table 6.3**, a Low magnitude. Following the criteria in **Table 6.4**, this would have a **Minor** significance and therefore Not Significant using the criteria in **Table 6.3**.

6.7.26 With the Flood Emergency Plan in place (which would be secured by condition, likely once the operator is confirmed), the risk to operatives would be Negligible. Following the criteria in **Table 6.4**, this would have a **Negligible** significance.

6.8 Secondary Mitigation and Enhancement

Construction and Decommissioning

6.8.0 Due to the overall Negligible significance of impacts during construction and decommissioning no secondary mitigation is required.

Operation

6.8.1 During operation, there are no impacts that are assessed as being Significant. Only two impacts are assessed as having a **Minor Adverse** significance; flooding to panels during the design event and flooding to containerised infrastructure during residual or exceedance events.

6.8.2 The mitigation proposed to panels and containerised infrastructure is considered sufficient to minimise damage to them and therefore their operation.

6.9 Residual Effects

6.9.0 There are no likely residual effects identified by this assessment.

6.10 Cumulative Effects

6.10.0 The core requirement of relevant flood risk and water quality legislation and policy is to negate impacts to third parties. Therefore, developments would only be consented where they demonstrate off-site impacts are negligible. Consequently, it is assessed that there would be no significant cumulative impacts from developments nearby.

6.11 Monitoring

6.11.0 No significant effects have been identified that would warrant monitoring.

6.11.1 However, it is recommended the Flood Emergency Plan is reviewed every three years or following a practice, drill or flood event that identifies required improvements. The review of the document should utilise the best available flood risk information at the time to ensure the plan keeps pace with climate change.

6.12 Consideration of Climate Change

6.12.0 As explained throughout this report, the projected impacts of climate change have underpinned this assessment as well as **Appendix B.1**, the FCA and drainage strategy.



Furthermore, the assessment of flood risk posed to and from the Proposed Development is conducted presuming the flood risk profile at the end of the Proposed Development lifetime.

6.13 Conclusions

Introduction

- 6.13.0 This Chapter provides an assessment of the likely effects to and from the Proposed Development on local flood risk and water resources.
- 6.13.1 The water resources include surface waters such as watercourses, ponds or lakes and groundwater quality.
- 6.13.2 The key policies that the assessment is testing against are:
- The Flood and Water Management Act 2010 including Schedule 3 that requires the use of sustainable drainage systems; and
 - Planning Policy Wales and its accompanying TAN15 that requires flood risks to be managed to maximise the operation of the site without negatively impacting third parties.
- 6.13.3 The assessment presumes a study area that extends 500 m from the Site boundary. This reflects the movement of water across the area and ensures that off-site impacts are mitigated, where applicable.
- 6.13.4 The defining feature of the Site is its topography. The Solar Site is on low-lying land that was presumably reclaimed and drained by a series of controlled watercourses for agricultural purposes. Therefore, this area is existing agricultural land.
- 6.13.5 The BESS Site is elevated and slopes more steeply.
- 6.13.6 As a consequence, the Solar Site is within an area that benefits from the presence of significant flood defences. The assessment demonstrates these defences provide sufficient protection to the site for its anticipated 40-year lifetime.
- 6.13.7 Specific flood modelling has been undertaken to simulate the impact of a breach in the local defences coinciding with a significant flood event, inclusive of the impacts of sea level rise and climate change. This is clearly very unlikely to occur but if it did happen at the end of the Proposed Development lifetime, flooding would be in the region of 1 m deep across the Solar Site. The BESS Site would remain well above the flooding.
- 6.13.8 The ground beneath the Solar Site is clays, siltstone, mudstone and sandstone, which is generally not permeable.
- 6.13.9 The surface waters and groundwater are not considered to be sensitive.

Construction and Decommissioning Effects

- 6.13.10 During construction and decommissioning, the activities with the highest potential to negatively impact the water environment is from vehicle movement activities causing an increase in runoff and soil erosion due to soil compaction.
- 6.13.11 The Proposed Development will include a detailed CEMP and Soil Management Plan that would embed good construction practices. Many of these practices would focus on minimising soil compaction. For example, access tracks would be constructed and used early in the construction programme.
- 6.13.12 The use of chemicals or oils would be limited, and good site management practices would minimise the chance for spills to impact the water environment.



Environmental Statement

- 6.13.13 Crossings (either vehicular or cables) over the watercourses would be minimised and would use existing farm access crossings wherever possible.
- 6.13.14 Temporary compounds and access tracks would be formed from permeable materials, so they allow water to drain to the ground as per the existing site.
- 6.13.15 With the mitigation in place, the impacts to and from the Proposed Development construction activities would be **Negligible**.

Operation Effects

- 6.13.16 The transition from agricultural land to solar farm with year-round grass cover would result in a reduction in the use of chemicals, fertilisers or animal densities on the Site. In turn, this will also improve the way the Site absorbs rainfall, meaning less surface water runoff.
- 6.13.17 Only very limited hardstanding would be used, in the form of isolated containers and the batteries. Where the containers are dispersed, rain falling on them would be directed to the ground locally to mimic existing conditions.
- 6.13.18 The battery compound would use a drainage strategy that stores rainwater, releasing it as slow as is possible to the local watercourse network.
- 6.13.19 Battery fires have received a lot of attention recently and with it claims that such fires release pollution to the water environment. However, the evidence shows that the chance for fires to occur is extremely low and well within socially acceptable limits.
- 6.13.20 Evidence from the few fires that have occurred globally also demonstrates no elevated levels of pollution is released from fires.
- 6.13.21 Regardless, significant mitigation measures are proposed to minimise the chance of fires and the release of contaminants. The batteries will be controlled so they can control temperature within them.
- 6.13.22 They would be watertight so if a fire occurred, contaminants would remain within the battery containers.
- 6.13.23 In the unlikely event contaminants were released, a sealed drainage system would be available in the gravel base beneath the BESS units. This gravel base system would prevent the discharge of contaminants to the water environment. It would have sufficient capacity to contain up to six hours of suppression spraying.
- 6.13.24 The BESS containers would be sited on limestone-based gravel which would neutralise acids released.
- 6.13.25 Flooding at the site would be limited to very extreme flooding or is the local defences failed, so very unlikely to occur. The Proposed Development would manage flood risks appropriately by raising the level of the panels, so they are above the predicted flood levels.
- 6.13.26 The battery compound would be in an elevated position so it would be well above predicted flooding.
- 6.13.27 Containerised infrastructure in the Solar Site would be located in areas of shallowest extreme flooding, where possible. They would also be raised to further reduce the chance of them flooding. Finally, during the detailed designs, efforts to make them waterproof will be considered.
- 6.13.28 With the mitigation in place, the impacts to and from the Proposed Development would be **Negligible**.



7 Archaeology

7.1 Introduction

7.1.0 This Chapter of the ES assesses the likely significant effects of the Proposed Development in terms of Archaeology. The archaeological resource to be discussed within this Chapter comprises known and potential buried archaeological remains. Effects upon the settings of historic assets (which may also be of archaeological interest) are considered separately with **Chapter 12: Built Heritage** of the ES. The assessment is based on the characteristics of the Site and surrounding area, as well as the key parameters of the Proposed Development detailed in **Chapter 3 – Site and Development Description**.

7.1.1 This Chapter is supported by a Historic Environment Desk-Based Assessment, which comprises **Appendix H.1**, a geophysical survey report presented in **Appendix C.1** and a Phase 1 Archaeological Evaluation interim report included as **Appendix C.2**.

7.1.2 This Chapter has been prepared by Cotswold Archaeology, a Registered Organisation with the Chartered Institute of Archaeologists. In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix A.4**.

7.2 Policy Context, Legislation, Guidance and Standards

7.2.0 Legislation, planning policy, and guidance relating to the assessment of the likely significant effects on the archaeological resource and pertinent to the Proposed Development comprises the documents listed below. More detail regarding these policies can be found in Chapter 6 of this ES.

Legislation

7.2.1 Legislation relating to archaeology comprises:

- The Historic Environment (Wales) Act 2023.²⁴ This consolidates previous legislation relating to heritage, with the relevant parts comprising Part 2 (Monuments of Special Historic Interest, including Scheduled archaeological sites) and Part 6 (Other historic assets and records).
- The Well-being of Future Generations (Wales) Act 2015²⁵ places a duty on decision makers to have regard to pursuing the promotion of the economic, social, environmental and cultural well-being of Wales in a way that accords with the sustainable development principle. It requires consideration of the historic environment (including archaeology) as an integral part of promoting cultural well-being and intergenerational equity.

National Planning Policy

7.2.2 National planning policy relating to the archaeological resource comprises:

²⁴ Welsh Government (2023) *Historic Environment (Wales) Act 2023 (Act of Senedd Cymru)*
<https://www.legislation.gov.uk/asc/2023/3/part/1>

²⁵ Welsh Government (2015) *Well-being of Future Generations (Wales) Act 2015*
<https://www.legislation.gov.uk/anaw/2015/2/>



- Planning Policy Wales (PPW) Edition 12. The Historic Environment is subject to Chapter 6 (pages 129-135)²⁶ which recognises the importance of conserving Scheduled Monuments, and other historic assets of archaeological interest. Any decisions made through the planning system must fully consider the impact on the historic environment and on the importance and heritage values of individual historic assets (including archaeological remains) and their contribution to the character of place.

Local Planning Policy

7.2.3 Local Planning Policy relating to the archaeological resource is as follows:

- Conwy County Borough Council Local Development Plan 2007-2022²⁷, in particular Strategic Policy CTH/1 – Cultural Heritage; Policy CTH/2 – Development Affecting Heritage Assets, and Policy CTH/4 – Enabling Development. These policies collectively aim to protect and manage archaeological and heritage assets within the Conwy County Borough, ensuring that development proposals consider and mitigate impacts on such assets.
- Denbighshire County Council Local Development Plan 2006-2021²⁸, in Policy VOE 4 – Enabling Development and Policy VOE 10 – Renewable Energy Technologies. These state that development proposals should carefully assess and mitigate impacts on heritage assets, including archaeological sites.

Relevant Guidance

7.2.4 The following guidance documents are relevant to this assessment:

- Technical Advice Note (TAN) 24: The Historic Environment²⁹;
- Conservation Principles for the Sustainable Management of the Historic Environment in Wales³⁰;
- Chartered Institute for Archaeologists' Standard and guidance for historic environment desk-based assessment³¹;
- Chartered Institute for Archaeologists' Standard and guidance for geophysical survey³²,
- Chartered Institute for Archaeologists' Standard for field evaluation³³.
- Chartered Institute for Archaeologists' Universal guidance for field evaluation³⁴;

²⁶ Welsh Government (2024) *Planning Policy Wales Edition 12* <https://www.gov.wales/sites/default/files/publications/2024-07/planning-policy-wales-edition-12.pdf>

²⁷ Conwy County Borough Council (2013) *Conwy Local Development Plan 2007-2022* <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Assets-written-proposals-maps/Conwy-Local-Development-Plan-2007-2022.pdf>

²⁸ Denbighshire County Council (2013) *Local Development Plan 2006-2021* <https://www.denbighshire.gov.uk/en/documents/planning-and-building-regulations/ldp/adopted-ldp/adopted-local-development-plan-2006-2021.pdf>

²⁹ Welsh Government (2017) *Technical Advice Note 24: The Historic Environment (TAN24)* <https://www.gov.wales/sites/default/files/publications/2018-09/tan24-historic-environment.pdf>

³⁰ Cadw (2011) *Conservation Principles for the Sustainable Management of the Historic Environment in Wales* https://cadw.gov.wales/sites/default/files/2019-05/Conservation_Principles_EN_0.pdf

³¹ Chartered Institute for Archaeologists (2020) *Standard and Guidance for Historic Environment Desk-Based Assessment* <https://www.archaeologists.net/sites/default/files/2023-11/CIfA-SandG-DBA-2020.pdf>

³² Chartered Institute for Archaeologists (2020) *Standard and guidance for archaeological geophysical survey* - <https://www.archaeologists.net/sites/default/files/2023-11/CIfA-SandG-Geophysical-Survey-2020.pdf>

³³ Chartered Institute for Archaeologists (2023) *Standard for archaeological field evaluation* - https://www.archaeologists.net/sites/default/files/2024-11/CIfA-Standard-Field-Evaluation_2023.pdf

³⁴ Chartered Institute for Archaeologists (2023b) *Standard for archaeological field evaluation* - https://www.archaeologists.net/sites/default/files/2024-11/CIfA-Standard-Field-Evaluation_2023.pdf



- Heritage Impact Assessment in Wales³⁵
- The Institute of Sustainability and Environmental Professionals (ISEP), and Chartered Institute for Archaeologists (CIfA) Principles of Cultural Heritage Impact Assessment in the UK³⁶.

7.3 Consultation

- 7.3.0 A Written Scheme of Investigation (WSI) for the Historic Environment Desk-Based Assessment (**Appendix H.1**) was submitted to the Heneb (The Trust for Welsh Archaeology) advisors for Clwyd-Powys and Gwynedd and approved on 19th December 2024. The Heneb advisors also provided comment on the preliminary geophysical survey results, as well as recommendations regarding the scope of the trial trench evaluation. A WSI for the trial trench evaluation was approved by Heneb on 10th June 2025.
- 7.3.1 The Scoping Direction (**Appendix A.3**) included a response from Cadw (Welsh Government's historic environment service), along with further comments from Heneb, both of which have informed this assessment.

7.4 Methodology

Study Area

- 7.4.0 A 1 km Study Area measured from the boundaries of the BESS Site and Solar Site was applied for the baseline assessment, with a 500 m Study Area utilised for the Cable Corridor. This was considered sufficient to capture the relevant data and provide the necessary context for understanding archaeological potential in respect of the Site.

Baseline Data Collection

- 7.4.1 This Chapter has been informed by the work presented within the Historic Environment Desk-Based Assessment which forms **Appendix H.1**. This consulted the following sources:
- Designated historic assets, as listed by Cadw;
 - Historic Environment Record data by Heneb: Clwyd-Powys Archaeology;
 - National Monuments Record of Wales (held by Royal Commission on the Ancient and Historical Monuments of Wales; RCAHMW);
 - Natural Resources Wales (NRW) lidar data;
 - Aerial photographs curated by the Central Register of Aerial Photographs for Wales;
 - Natural Resources Wales (NRW) Landmap data;
 - Portable Antiquities Scheme (PAS) data regarding findspots ;
 - Historic maps; and
 - British Geological Survey.
- 7.4.2 Walkover surveys of the Site were carried out in October 2024 and March 2025.

Cadw (2017) *Heritage Impact Assessment in Wales* <https://cadw.gov.wales/sites/default/files/2019-05/20170531Heritage%20Impact%20Assessment%20in%20Wales%2026917%20EN.pdf>

³⁶ The Institute of Environmental Management and Assessment, Institute of Historic Building Conservation and Chartered Institute for Archaeologists (2021) *Principles of Cultural Heritage Impact Assessment in the UK* https://www.archaeologists.net/sites/default/files/2024-11/CIfA-IEMA-Principles-Cultural-Heritage-Impact-UK_2021.pdf



- 7.4.3 A geophysical survey was carried out within the Site by AOC Archaeology Group between August 2024 and May 2025 (**Appendix C.1**).
- 7.4.4 Following the geophysical survey and consultations with Heneb, a trial trench evaluation was conducted within the Solar and BESS Sites in July 2025 (**Appendix C.2**). This comprised Phase 1 of the evaluation, which will inform the Pre-Application Consultation process. Phase 2 of the evaluation will be carried out in September 2025, with the results added to the ES Chapter submission version. A total of 12 trenches were excavated within the Solar Site as part of Phase 1 (within Parcels 3 and 5), with seven excavated in the BESS Site. As agreed within Heneb, the Phase 2 evaluation will include a further 45 trenches within the Solar Site.
- 7.4.5 The results of the above surveys have informed the selection of sensitive receptors within this Chapter, which have been identified on the basis of their known or potential importance, and the potential for this importance to be harmed by the Proposed Development.
- 7.4.6 The baseline assessment included review of an archaeological assessment and consultation responses for the operational solar farm immediately adjacent to the Solar Site (Conwy planning application ref. 0/40999), the boundary of which included a number of fields within the Site. The assessment submitted for the application concluded that there is a low potential for significant archaeological remains to be present within the boundary of the consented scheme (including those parts which coincide with the Solar Site), largely on account of it having formed marshland until its reclamation in the 19th century. The consultation response from Clwyd-Powys Archaeological Trust agreed with this conclusion and determined that further archaeological works in relation to the scheme would not be necessary.

Assessment

Receptor Sensitivity/Importance/Value

- 7.4.7 The assessment of importance of historic assets of archaeological interest has been guided primarily by the policies and guidance contained in Cadw's 'Conservation Principles'. This defines the importance of a historic asset with reference to the following four key forms of value set out in **Table 7.1**.

Table 7.1: Historic values

Values	Description
Evidential	Derives from those elements of a historic asset that can provide evidence about past human activity, including its physical remains
Historical	Derives from aspects of past ways of life, or association with notable families, persons, events, or movements – it embodies the connection between past events and society with the present
Aesthetic	Derives from the sensory and intellectual stimulation drawn from a historic asset. It may include its physical form, and how it lies within its setting. It may also be the result of design, or an unplanned outcome of a process of events
Communal	Derives from the meanings that a historic asset has for the people who relate to it, or for whom it figures in their collective experience or memory. It may be commemorative or symbolic and relate to issues of identity or collective memory

- 7.4.8 Criteria for assessing historic value (sensitivity / importance) are set out in **Table 7.2**. As well as considering the principles above, this reflects current heritage legislation and policy for Wales and professional best-practice guidance, including the Cadw publication 'Heritage Impact Assessment in Wales'. The terms expressed in the 'Planning Policy Wales' are used. This defines that the 'most important historic assets' often have statutory protection or are included



in formal registers (World Heritage Sites, Scheduled Monuments, Protected Wreck Sites, Registered Battlefields, etc). The term significance, as adopted by Planning Policy Wales to describe the interests or values of a historic asset or assets, has been avoided here to save confusion with the EIA terminology of significance criteria and 'significant effects'.

Table 7.2: Importance of Historic Assets

Importance of resource / asset	Description
High	World Heritage Sites and historic assets of acknowledged international importance, or that can contribute significantly to acknowledged international research objectives. Scheduled Monuments and undesignated assets of Schedulable quality and importance, according to the non-statutory criteria for scheduling ancient monuments utilised by the Secretary of State. Archaeological remains that can contribute substantially to acknowledged national research objectives.
Medium	Archaeological remains that contribute to regional research objectives.
Low	Archaeological remains displaying limited evidential, historic, aesthetic, or communal value as identified by Conservation Principles. Archaeological remains that contribute to a limited degree to regional research objectives.
Uncertain	Archaeological remains, the importance of which has not yet been ascertained.
Negligible	Archaeological remains that cannot appreciably contribute to acknowledged regional research objectives.

Magnitude of Impact

- 7.4.9 The magnitude of impact upon historic assets of archaeological interest is defined as the change resulting from development that affects the asset's values. The classification of the magnitude of change on historic assets is rigorous and based on consistent criteria. This takes account of such factors as the physical scale and type of disturbance anticipated and whether features or evidence would be lost that are fundamental to their integrity. Changes may be adverse or beneficial. Depending on the nature of the change and the duration of development, effects can be temporary and/or reversible or permanent and irreversible. Change in itself, however, may not necessarily be harmful to historic assets. It is noted that Cadw's 'Conservation Principles' defines 'preserve' as 'to keep safe from harm'.
- 7.4.10 This will include the consideration of such issues as: which, and how many, elements of a historic asset of archaeological interest are affected and whether the change in the importance of an asset will be adverse or beneficial.
- 7.4.11 The magnitude of impact on each individual historic asset is assessed using the criteria in **Table 7.3**. Changes may be adverse or beneficial; however, in the most part the descriptions offered below focus on adverse change.

Table 7.3: Magnitude of Impact

Magnitude of Impact	Description
High	Changes such that the importance of the asset is totally lost.



Magnitude of Impact	Description
Moderate	Changes such that the importance of the asset is partially lost/truncated.
Low	Changes such that the importance of the asset is slightly lost/truncated.
No Impact	Inconsequential changes to archaeological remains.

Significance of Effect

7.4.12 The significance of effect upon archaeological remains is a product of the importance of the asset, and the magnitude of impact upon its values. This is summarised in

7.4.13 **Table 7.4.** Where two alternatives are given in the table, professional judgement is used to decide which best reflects the significance of effect.

Table 7.4 Criteria for Significance of Effect

Magnitude of Impact	Historic Asset Importance			
	High	Medium	Low	Negligible
High	Substantial	Major	Minor to Moderate	Negligible
Medium	Major to Moderate	Minor to Moderate	Minor	Negligible
Low	Minor to Moderate	Minor to Moderate	Minor	Negligible
No Impact	Negligible	Negligible	Negligible	No Effect

7.4.14 Regarding the significance of the effect upon archaeological remains, the key principle to be considered is whether the effect is classified as 'significant' (via the EIA regulations (Wales))³⁷. For the purposes of this report 'significant effects' are considered to be of 'Moderate' significance of effect or higher. A 'Minor to Moderate' significance of effect is considered at the upper end of 'not significant'. The significance of effect can be adverse or beneficial. Such effects may also be temporary or permanent, and reversible or irreversible.

7.4.15 The measured significance of effect may be equated to key concepts in planning policy and heritage guidance regarding the assessment of development effects upon historic assets, as per **Table 7.5**. When a significant effect is identified, it may be appropriate to propose suitable mitigation measures to avoid, reduce or offset the effect.

Table 7.5: Description of the significance of effect with reference to heritage policy

Significance of Effect	Criteria
Substantial Adverse	Total loss of the values of a designated historic asset (or asset worthy of designation) such that development should not be consented unless substantial public development is delivered.

³⁷ Welsh Government (2017) *The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017*. Statutory Instrument 2017 No. 567 (W. 136)



Significance of Effect	Criteria
Major Adverse	Extensive harm to the values of a designated historic asset (or asset worthy of designation) such that development should not be consented unless substantial public benefit is delivered by the development. Total loss of a historic asset of medium importance without compensatory mitigation measures. Extensive harm to a landscape designated by virtue of its historic landscape value.
Moderate Adverse	Less than extensive harm to or total loss of the values of a designated historic asset (or asset worthy of designation) such that the harm should be weighed against the public benefit delivered by the development to determine consent. Total loss of a non-designated historic asset of medium importance (i.e. which may contribute to regional research objectives) with compensatory mitigation measures agreed with statutory consultees. Harm to a non-designated historic asset, of a greater degree than that perceived of as Minor Adverse, which should be considered in determining an application.
Minor Adverse (not significant)	Less than extensive harm to the value of a designated historic asset, of a lesser degree than that perceived as Moderate Adverse, but which should still be weighed against the public benefit delivered by the development to determine consent. Harm to a non-designated historic asset that can be adequately compensated through the implementation of a programme of industry standard mitigation measures.
Negligible	Effect that is imperceptible.
No effect	Effect that is nil.
Minor Beneficial (not significant)	Development will deliver a positive contribution and / or better reveal the values of a non-designated historic asset.
Moderate Beneficial	Development will deliver a positive contribution and / or better reveal the values of a designated historic asset (or asset worthy of designation) such that an application should be treated favourably.
Major Beneficial	Development will deliver a positive contribution and / or better reveal the values of a designated historic asset of recognised greater importance such that an application should be treated very favourably.
Substantial Beneficial	Development will deliver a positive contribution and / or better reveal the values of many designated historic assets of recognised international importance such that an application should be treated very favourably



Limitations

- 7.4.16 This Chapter has been informed by data collation, research and assessment presented within the Historic Environment Desk-Based Assessment in **Appendix H.1**. This relied upon secondary information derived from a variety of sources. The assumption is made that this data, as well as that derived from secondary sources, is reasonably accurate. The analysis of potential buried archaeological remains includes an inherent degree of predictive modelling and is an industry accepted approach. However, these assumptions and use of the terminology 'potential values or importance' do not undermine the quality or robustness of the assessment presented here.
- 7.4.17 Further clarification regarding the baseline conditions within the Site was provided by the Geophysical Survey (**Appendix C.1**). Geophysical results cannot provide a definitive understanding of below ground conditions and archaeological potential and are instead a direct measurement of subsurface properties. Detecting and mapping of archaeological remains requires that any such remains have properties that can be measured by the chosen geophysical technique and that these properties have sufficient contrast with the background to be identifiable. The interpretation of any identified anomalies is inherently subjective, and it is often not possible to classify all anomaly sources. In this specific instance, the relative reliability of the survey as a method by which to explore the potential for buried archaeological remains has been demonstrated, in so far as it has identified previously unrecorded remains.
- 7.4.18 The archaeological potential within the Solar and BESS Sites was further explored through Phase 1 trial trench evaluation (**Appendix C.2**), which verified the results of the desk-based assessment work and geophysical survey (**Appendix C.1**). While archaeological trial trenching supplements and refines the quality of the information on buried remains, this technique also has its own limitations as it involves the removal (archaeological excavation) of remains that possess evidential value. Thus, the scale of this work is minimised so as not cause undue harmful impacts, but these impacts will occur, nonetheless. Therefore, a fine balance must be had to minimising the impact of this work while attempting to better understand the extent and importance of the buried archaeological remains. The level of detail of assessment should be proportionate to the importance of the assets, and sufficient to understand the potential impacts, and the extent of any investigative work should also be proportionate to the extent of proposed ground disturbance. Most importantly, the evaluation is informed by a robust understanding of, and reflects the likely impacts of the Proposed Development, which in this case are relatively limited.

7.5 Baseline Conditions

- 7.5.0 This section of the Chapter identifies key historic assets which have the potential to be impacted by the Proposed Development, and which could be subject to significant effects (sensitive archaeological receptors). The value of these assets is detailed such that the potential impacts can be assessed. As such it should be noted that not all historic assets within the Study Area are reported on and assessed within this ES Chapter; details upon all historic assets not discussed here are presented in **Appendix H.1**.
- 7.5.1 Sensitive receptors are depicted on **Figure 7.1**, with their identifying labels corresponding to those assigned in the Historic Environment Desk-Based Assessment in **Appendix H.1**.

Designated Historic Assets

- 7.5.2 There are no designated historic assets within the Solar or BESS Sites. The Cable Corridor passes through Kinmel, a Grade II* Registered Historic Park and Garden (RHPG) (ES Figure 12.1: P2), the boundary of which also lies immediately east and west of the Solar Site. Effects upon the importance of the RHPG as arising through changes to its experience are considered in Chapter 12- Built Heritage.



Known and Potential Archaeological Remains within the Site

- 7.5.3 The underlying geology of the Solar Site, comprising alluvial and tidal flat deposits in a low-lying area adjacent to a former wetland environment, indicates some potential for deeply buried early prehistoric horizons, including Palaeolithic and Mesolithic material. Paleochannels within the Solar and BESS Sites, identified by the geophysical survey and Phase 1 trial trench evaluation, were confirmed by geoarchaeological assessment to contain a complex sequence of Holocene deposits, with potential for prehistoric paleoenvironmental and archaeological deposits at depths of between 2 m and 3 m below ground level. The importance of such remains would depend upon their form and degree of survival but is unlikely to be greater than **Medium**.
- 7.5.4 No definitive evidence of Neolithic, Bronze Age, or Iron Age (later prehistoric) activity has been identified within the Site or the Study Area, although known sites of these periods, including potential Bronze Age funerary monuments and Iron Age hillforts, are recorded in the wider surrounding landscape. The geophysical survey identified a number of anomalies within the Solar Site indicative of archaeological remains, including potential rectilinear, curvilinear and possible discrete features which are morphologically consistent with a later prehistoric origin. The Phase 1 trial trench evaluation confirmed the presence of some of these features within Parcels 3 and 5 of the Solar Site, although no datable evidence was recovered and it was considered that the investigated features may be more likely to be of post-medieval origin. The greatest concentration of anomalies identified as potentially relating to prehistoric activity was identified in Parcels 2 and 4 of the Solar Site, which will be investigated by Phase 2 of the evaluation; no features indicative of later prehistoric date have been identified within the BESS Site. Confirmed remains of these periods would potentially be of **Medium** importance, subject to their form, function, and degree of survival.
- 7.5.5 The southern section of the Cable Corridor partly follows the projected alignment of the Roman road connecting Chester to the Roman fort at Caerhun, now broadly followed by the modern B5381. Direct archaeological evidence of the road within the Cable Corridor is limited, however sections of metalled surface have been identified in two places beneath and adjacent to the modern road, while a stony ridge and grass covered scarp visible on the northern side of the modern road has been interpreted as a potentially related earthwork. Elsewhere within the Study Area, evidence of Roman period activity comprises isolated findspots, consistent with a general background level of activity in the local landscape. Some of the features identified within the Solar Site by the geophysical survey, particularly within Parcels 2 and 4 (to be investigated by Phase 2 of the evaluation), could potentially be of Roman date based on their morphology, but are not indicative of any higher status or substantial settlement. No finds of Roman date were recovered during the Phase 1 evaluation. Subject to their form, extent and degree of survival, remains of Roman activity within the Site are expected to be of **Medium** importance.
- 7.5.6 The First Edition Ordnance Survey depicts the location of the early medieval Battle of Rhuddlan Marsh (Morfa Rhuddlan) within Parcel 3 of the Solar Site (**Appendix H.1**). The battle took place in AD 795 between the Welsh and King Offa of Mercia and marks a key event in early medieval Welsh history. However, the location of the battlefield remains uncertain, and later maps denote its location further to the north-west, well beyond the Site. Battlefields from this period are rarely identifiable in the archaeological record and no remains of the battle are likely to be present within the Site; no features or finds of early medieval date, or that could be consistent with a battlefield, were identified within the Parcel 3 by the Phase 1 evaluation. The only archaeological evidence of early medieval date within the Study Area comprises a single find of a zoomorphic mount and the potential for any finds or features of this period to present within the Site is considered low. Any remains that might be present can be anticipated to be of **Medium** importance, depending on their form, extent and degree of survival.
- 7.5.7 Much of the Site is likely to have been in agricultural use from the medieval period onwards, with the northern part of the Solar Site located within marshland until its drainage in the mid-19th century. Linear features likely representing remains of former field boundaries and drainage ditches have been identified within the Solar and BESS Sites by the geophysical



survey and Phase 1 trial trench evaluation, some of which yielded small quantities of finds including post-medieval pottery and ceramic building material. These, and other potential agricultural remains of medieval, post-medieval and modern date are of **Low or Negligible** importance.

- 7.5.8 The Cable Corridor runs through Kinmel Park, a Grade II* Registered Historic Park and Garden that originated in the 17th century as the landscaped grounds to a private mansion, before being redesigned in the 19th century. During the First World War the park was used as a military training ground, with temporary structures and training grounds and practice trenches. The layout of these trenches and other military features has been investigated through documentary sources, historical maps and aerial photographs, lidar surveys and limited archaeological investigation. These have identified parallel practice trenches about 21 m long, separated by spoil banks within the Cable Corridor. These are near destroyed and no longer visible on modern aerial or lidar images but can be expected to survive as subsurface features. These would contribute some evidential value to the park through demonstrating this phase of its use, although their overall importance is considered to be **Low**. Any buried remains relating to former parkland features are also expected to be of **Low** importance.
- 7.5.9 Kinmel Park Railway was established in 1915 to serve the military camp and extended through Parcels 3 and 5 of the Solar Site (**Appendix H.1**). Following the end of the war the line continued in use, serving a nearby quarry site at St George, eventually closing in the 1960s. The railway trackbed was identified in the Solar Site by the geophysical survey. The railway is best understood through documentary and cartographic sources, and the associated buried remains are **Negligible** importance.
- 7.5.10 Most of the buried archaeological remains identified by the geophysical survey and Phase 1 trial trench evaluation survey are undated. The form and morphology of these features allow reasonably well-informed judgments to be made regarding their likely origins and character; however, in the absence of any definitive evidence to their importance remain uncertain. Based on the character of the known resource, it is not anticipated that any remains of more than **Medium** importance would be present.

Baseline Evolution

- 7.5.11 In the event that the Proposed Development does not progress, ongoing (future) cultivation of the arable fields within the Site is likely to result in continued and sustained degradation of the prevailing condition and state of preservation of surviving archaeological remains. Evidence for plough damage, including plough scars and furrows, was identified within Parcels 3 and 5 of the Solar Site by the Phase 1 trial trench evaluation. The scale of this loss cannot be easily defined, but this is an industry recognised trend and something that for important buried remains is being actively managed via stewardship agreements and agri-environmental conservation plans to prevent further degradation.

7.6 Primary and Tertiary Mitigation

Primary Mitigation

Construction

- 7.6.0 Measures incorporated into the Proposed Development relevant to archaeological remains during Construction comprise:
- Design of Proposed Development layout to ensure key areas of impact (such as access tracks and compounds) avoid known areas of more sensitive archaeological remains as far as possible; and
 - The removal of the solar PV panel areas from ploughing and the predominant use of low-level piling, which minimises impacts upon buried archaeological remains (with piling being less damaging than the widespread horizontal disturbance caused by ploughing).



- 7.6.1 While the surveys undertaken to date have enabled a better understanding of the archaeological resource within the Site, and will inform appropriate mitigation measures ahead of construction, a critical assumption of this assessment is the nature and scope of mitigation measures available to completely avoid or minimise adverse impacts. This is discussed in further detail in the Secondary Mitigation Section 7.8 of this Chapter however, in summary, the detailed design process (i.e. to identify the exact routes of cable trenches etc) will allow for important (specifically sensitive) buried archaeological remains to be protected from any form of disturbance or appropriately recorded.

Operation

- 7.6.2 Effects upon the buried archaeological resource would occur during construction and thus no primary mitigation measures during Operation are required.

Decommissioning

- 7.6.3 Effects upon the buried archaeological resource would primarily occur during construction and no primary mitigation measures during Decommissioning are required.

Tertiary Mitigation

Construction

- 7.6.4 The oCEMP (**Appendix A.5**) will ensure that construction activities avoid or minimise any impact upon more sensitive archaeological remains (where the detail design provides for their preservation in situ).

Operation

- 7.6.5 Effects upon the buried archaeological resource would occur during construction and no tertiary mitigation measures during Operation are required beyond those set out in the Operational Environmental Management Plan (OEMP) which will restrict any maintenance activity that might cause ground disturbance (and thus potentially impact archaeological remains).

Decommissioning

- 7.6.6 The oDEMP (**Appendix A.6**) will set out measures to minimise impacts on archaeological remains outside areas where any prior disturbance to archaeological remains may have already occurred during construction, thus avoiding any further effects upon archaeological remains during decommissioning.

7.7 Assessment of Likely Significant Effects

- 7.7.0 This section describes the potential effects on archaeological remains during the construction and operation phases of the Proposed Development. The discussion below takes account of the embedded mitigation measures as described above, when considering potential effects of the Proposed Development. Those components of the Proposed Development that could potentially affect archaeological remains are summarised below, as relevant.
- 7.7.1 This section should be read alongside **Appendices C.1, C.2 and H.1**, which contain further detail regarding the sensitivities associated with potential sensitive receptors. This information is not repeated here in full, but summarised where potential effects are anticipated.



Construction

In Situ Preservation

- 7.7.2 In situ preservation of archaeological remains will occur across parts of the Site where no groundbreaking works are proposed. Principally this will be within areas devoid of any components of the Proposed Development, including areas set aside for biodiversity and habitat enhancement, retained as buffers for various easements for underground utilities (gas pipes, water pipe, and offshore wind farm cable), retained as buffers between the solar PV arrays and settlements or residential properties, and areas of elevated ground left free of development to minimise visual effects upon the landscape.
- 7.7.3 This would allow for the preservation in situ of identified buried archaeological remains within the south of Parcel 3 (**Appendix C.1**), which are currently undated but assessed as being of potentially medium importance on the basis of their form being consistent with a prehistoric or Roman origin. The benefit of removing the features from the disturbance caused by ploughing would be an overall **Minor to Moderate Beneficial** effect.

Solar PV Array

- 7.7.4 Piling associated with the solar PV array would result in limited impacts. The installation of the solar PV panels will require the insertion of piles, driven or screwed into the ground into the indicative maximum depth of around 2-3 m, depending on ground conditions. Fencing and CCTV etc. would also be post mounted. Low voltage cabling between PV panels and the inverters will typically be located above ground, fixed to the mounting structures, and then underground leading to central inverters. Construction of internal access tracks would include minimal excavation, with tracks measuring 3.5-5 m in width and constructed of compacted aggregate and permeable membrane. Supporting infrastructure (inverters and 33kv sub distribution unit) will be distributed within the solar PV arrays and, depending on ground conditions, will be mounted on piles or concrete slabs.
- 7.7.5 It should be noted that within the design of the solar PV array, care has been taken to avoid identified archaeological remains (especially those of Medium value), from disturbance by access tracks or supporting infrastructure. Detailed design would also ensure that impacts from cable trenches within the solar PV arrays are minimised.
- 7.7.6 Archaeological remains which fall within the solar array comprise:
- Potential paleoenvironmental remains within preserved organic deposits in paleochannels, of potential Medium importance
 - Undated but potentially late prehistoric or Roman remains of likely Medium importance;
 - Remains associated with medieval and later agricultural activity and land reclamation, of Negligible to Low importance; and
 - Remains of former Kinmel Park railway, of Negligible importance.
- 7.7.7 Overall, the footprint of the abovementioned components of the Proposed Development – piling, topsoil stripping and excavations – is anticipated to be very limited in area (typically a fraction of any given solar PV site), resulting in only Minor adverse effects upon most classes of archaeological features. Specifically, with regard to the piling, the quantity of displaced archaeological remains in the case of larger features such as infilled ditches would be insignificant compared to that left undisturbed. For discrete or less robust buried features such as pits, post holes or stake holes and any further cremation burials, the probability that piles would be aligned in such a way that any more than a small percentage of the features would be affected is very low.



- 7.7.8 As such, the magnitude of impact upon archaeological remains (holding evidential values and expected to be of no greater than Medium importance) within the solar PV arrays is anticipated to be Minor adverse (due to the partial loss of evidential value). However, weighing this impact against the benefit of removing of these remains from ploughing (thus preventing further degradation during the operational life of the Proposed Development), the significance of effect would be **Minor Adverse or Negligible** at most and therefore **Not Significant**.

BESS and compounds

- 7.7.9 Topsoil stripping and excavations associated with creation of compounds, both for construction and establishment of components of the Proposed Development, such as BESS and on-site substation, will result in localised impacts in general, but extensive within the footprint of the compounds, upon known and potential archaeological remains.
- 7.7.10 The BESS compound will be located in the south of the BESS Site and will comprise a total of approximately 90 units set into concrete pillar foundations, along with transformer/inverter stations. The BESS compound overlaps with broad locations where archaeological remains have been identified, relating to post-medieval agricultural activity. These remains are of Negligible importance.
- 7.7.11 The substation compound will be situated within the central part of the BESS Site, and will comprise a substation building with a footprint of 26.7 m in length and 9.5 m width, two auxiliary transformer buildings of 10.3 m in length and 7.4 m width and a transformer of approximately 14.0 m and 7.3 m. The compound coincides with the location of a paleochannel identified by the geophysical survey and Phase 1 trial trench evaluation. This feature is of Negligible importance, though has a limited potential to contain paleoenvironmental remains of potential Medium importance at predicted depths of 2-3 m below ground level.
- 7.7.12 As the establishment of compounds and foundations is anticipated to result in truncation or total loss of archaeological remains within the footprints of intrusive groundworks, this is assessed as being a large adverse magnitude of impact. Such impact to assets of Low to Medium importance would result in a **Permanent Moderate Adverse** effect, which (prior to consideration of additional mitigation measures) would be **Significant**, or **Permanent Minor Adverse** effect to assets of Negligible importance which would be **Not Significant**.

On-site cabling and Cable Corridor

- 7.7.13 The exact locations and construction specifications of the on-site cabling will be subject to detailed design and dependent upon ground conditions. The detailed design will ensure that impacts upon sensitive remains are avoided during these works or minimised, such as by routing cables to avoid areas of more complex archaeological features. Archaeological remains which could be affected by the ground works associated with the onsite cabling are expected to be of no greater than Medium importance.
- 7.7.14 Excavations within the Cable Corridor would result in truncation or total loss of archaeological remains, if present within the footprints of the groundworks. Identified archaeological remains which may be affected by groundworks within the Cable Corridor include the potential First World War Practice Trenches within Kinmel Park Registered Park and Garden. These are assessed as being of Low importance and would experience localised impacts with only a small portion of the overall features affected. This would comprise a **Permanent Minor Adverse** effect which is **Not Significant** upon this Low importance asset. Within the section of Cable Corridor that coincides with the projected route of the Roman Road, the survival of associated archaeological remains is expected to have been previously impacted by the construction of the modern road. Construction impacts would affect only a small proportion of any surviving remains, resulting in a **Permanent Minor Adverse** effect overall which is **Not Significant**. For other potential archaeological remains which are expected to be of no greater than Medium importance, the effect would be **Permanent Moderate Adverse** and therefore **Significant**, prior to additional mitigation measures set out below.



Operation

- 7.7.15 Impacts upon potential buried archaeological remains would be confined to the construction phase of the Proposed Development, during which the impacts upon the buried archaeological features would occur within the footprint of the groundbreaking works.
- 7.7.16 Potential for additional below ground impacts during the operation and maintenance of the Proposed Development is limited but may include activities associated with the replacement of the key equipment, as set out in the OEMP. It is anticipated that replacement equipment (BESS, switch station, inverters) would not necessitate additional below ground impacts (as existing concrete base foundations would be reused), replacement piling (if not placed in the exact same location) could potentially result in localised additional impacts to archaeological remains. Any such additional impacts would be permanent and would lead to **Negligible** effects upon assets of Medium, Low or Negligible importance and this is **Not Significant**.

Decommissioning

- 7.7.17 Physical impacts resulting from construction would not be reversed during decommissioning, and construction groundworks within areas of greater impact (BESS, compounds, substation and the cable trenches etc.). As such, those areas in which construction is anticipated to result in truncation of archaeological remains, where present, would be unlikely to require further consideration during the decommissioning phase.
- 7.7.18 There is a degree of uncertainty regarding potential harm upon the archaeological remains during decommissioning phase as the likely methodology of the removal of the solar PV infrastructure may differ as a result of potential change in technology during the operation phase. While removal of piles, cables, foundations or access tracks, or restoration of these elements of land to agricultural use may impact archaeological remains which survive just outside the areas of disturbance originally caused during the construction works, appropriate methodology will serve to minimise those effects (e.g. by demarcating traffic areas, avoiding undertaking works during wet weather etc.). Such effects would be likely to be immaterial/negligible and still considerably less disturbing to archaeological remains than the ongoing ploughing regimes.

7.8 Secondary Mitigation and Enhancement

- 7.8.0 As potential significant effects have been identified, mitigation may be necessary to adequately address adverse effects, to reduce or offset the harm to (effect on) the sensitive archaeological assets.

Construction

- 7.8.1 The impacts upon the archaeological remains, which may lead to significant effects, would occur during the construction phase and therefore any mitigation considered necessary would be implemented prior to or during this phase of development. The completed surveys have ensured that any sensitive remains are identified, appropriately assessed and safeguarded, through flexibility of detailed design measures and a suite of available and industry standard mitigation.
- 7.8.2 Measures allowing the option for mitigation through design (avoidance) include:
- Areas where no components of the Proposed Development are proposed with appropriate measures in place to ensure no below ground impacts would be incurred. This is relevant to parts of the Site devoid from any infrastructure, but also to site cabling, the detailed design of which would seek to avoid impacts on known archaeological remains where feasible; and
 - In exceptional cases, such as where high value remains of Schedulable quality are identified, localised use of 'no-dig' construction solutions. These could comprise excluding



discrete areas from solar PV arrays and associated infrastructure as well as creating 'archaeology exclusion zones' during construction. The 'no-dig' complimentary techniques involve ballast footings (such as concrete shoes) to avoid piling completely, or areas where cabling is excluded (to reduce any impacts to the low-level piling only).

- 7.8.3 Where the detailed design determines that 'no-dig' solutions are not viable or warranted, small-scale and localised archaeological excavations will take place, to record the expected buried remains in advance of construction. These locations are more likely to be those where comprehensive ground disturbance from construction is anticipated (BESS, substation, trenching associated with cabling) and where there is less flexibility in the design (regarding the specific location of the works or the required construction methods). The results of these archaeological excavations will be published and disseminated to the public in a manner proportionate to the nature of the importance of the discovered remains. The unavoidable loss of evidential value would be offset by the advancement of our understanding (enhanced historical value) and the public benefits the dissemination of the results would deliver.
- 7.8.4 These are industry standard (mitigation) and good practice responses to discovered (and important) buried archaeological remains.
- 7.8.5 The strategy and approach for appropriate measures to mitigate the identified impacts from construction of the Proposed Development upon heritage assets of archaeological value, will be agreed with the relevant stakeholders.

Operation

- 7.8.6 Effects upon archaeology remains are primarily confined to the construction phase and thus no secondary mitigation is required during operation beyond any management regimes put in place to protect buried remains (as noted above regarding potential 'no-dig' areas and as set out in the OEMP).

7.9 Residual Effects

Construction

- 7.9.0 Following the implementation of the embedded and additional mitigation measures, it is considered that in the worst-case scenario, the residual effect would be a **Negligible and Not Significant** upon archaeological remains within the areas of greatest disturbance. The suite of mitigation options available during the detailed design phase will allow for this already non-significant adverse effect to be further reduced or potentially avoided completely. The cessation of impacts incurred through ploughing would off-set the limited loss of remains via piling.

Operation

- 7.9.1 Effects upon archaeological remains during operation have been assessed, in the worst-case scenario, as Negligible (not significant) and no additional mitigation is proposed beyond those embedded mitigation measures set out above. The residual effect remains therefore remains **Negligible and Not Significant**.

7.10 Cumulative Effects

- 7.10.0 The assessment of cumulative effects considers the construction and operation impacts of the Proposed Development together with other existing, consented or foreseeable developments. The committed developments set out in **Table 7.6**, are considered to have the potential for cumulative effects when considered alongside the Proposed Development due to their location within proximity to the Site and the type of development.



Table 7.6: Committed Development list

Site Address and Application Reference Number	Description	Decision	Distance to from site
Land immediately north of A547 Rhuddlan Road Towyn Conwy. 0/40999	Installation of ground mounted photovoltaic (PV) solar arrays to provide 24MW generation capacity together with inverter buildings, internal maintenance access track, landscaping, fencing and ancillary infrastructure.	Approved with conditions	Immediately adjacent and partly overlapping with Solar Site
Awel y Mor Offshore Wind Farm EN010112	Wind farm and associated development	Approved with conditions	Elements associated with construction and operation fall within the BESS Site
Mona Offshore Wind Farm EN010137	Wind farm and associated development	Approved with conditions	Elements associated with construction and operation fall within the BESS Site
St Asaph DNS CAS-01392-D2TSF3	Provision of photovoltaic solar farm and ancillary infrastructure	Scoping been submitted	Approximately 800 m south-east of BESS Site
Land Adjacent to Maes Owen, Abergele Road 40/2024/1079/PF	49 dwellings with roads and open space	In planning – decision pending	Approximately 500 m south-east of Solar Site
Land at Bryn Morfa 40/2023/0627	31 dwellings with access roads	Approved	Approximately 600 m south-east of Solar Site

Construction

- 7.10.1 Construction groundworks works associated with the construction of other developments have the potential to physically impact the archaeological resource.
- 7.10.2 As set out above, the Proposed Development would potentially lead to the loss or disturbance of buried archaeological remains within the footprint of below ground impacts, with low level impacts associated with piling, and greater, but localised, impacts from the cable trenches, access tracks, BESS and substation.
- 7.10.3 The cumulative impacts to the buried archaeological resource arising from the Proposed Development and the nearby cumulative schemes would likely comprise some degree of loss through intrusive groundworks. However, this impact is reduced through design measures (such as avoidance), through the use of piling for the installation of photovoltaic panel frames, which limits the area of impact within the sites, and through the implementation of appropriate further measures. In the case of land north of A547 Rhuddlan Road (0/40999), partially within the Solar Site, the archaeological assessment concluded that there was a low potential for any significant remains to be present within the site. No notable archaeological remains within the other identified schemes have any meaningful associations with known and potential remains within the Site.



- 7.10.4 Accordingly, the cumulative impact would be **Negligible** on archaeological remains of Low to Medium importance. This is a **Not Significant** effect.

Operation

- 7.10.5 Impacts upon archaeological remains are limited to the construction phase, therefore there is no potential for significant cumulative effects during operation.

7.11 Monitoring

- 7.11.0 To ensure that no additional impacts upon archaeological remains would occur, an appropriate strategy would be implemented during construction, operation and decommissioning to minimise the likelihood of any groundworks occurring within any areas where mitigation by design (avoidance or 'no dig' approaches) has been identified, or (for operation and decommissioning) any impacts outside areas where archaeological remains have already been disturbed during construction.

7.12 Consideration of Climate Change

- 7.12.0 Based on the UKCP18 projections identified in relation to the Site, climate change is expected to result in increased frequency and severity of extreme weather events, including heavier rainfall, more frequent storms, drought conditions, and temperature fluctuations. Archaeological remains within near-coastal environments, particularly reclaimed intertidal zones such as much of the Solar Site and adjacent low-lying dryland, are especially vulnerable to the effects rising sea levels and increased frequency of flooding which may lead to erosion or re-saturation, disturbing stratigraphy and compromising the preservation of buried remains. In formerly waterlogged or peat-rich areas, changes in hydrology and soil chemistry can accelerate the decay of organic materials such as timber and plant remains, which rely on stable anaerobic conditions for survival. On dryland, increased periods of drought can lead to desiccation, soil shrinkage, and cracking, which may cause physical damage to buried features and deposits.
- 7.12.1 The impact of climate change on buried archaeological remains is therefore considered indirect and long-term, with a Negligible to Minor Adverse effect depending on future environmental change and site management. The Proposed Development is not anticipated to increase or accelerate these risks.

7.13 Conclusions

Introduction

- 7.13.0 An assessment of the potential effects of the Proposed Development on the buried archaeological resource has been undertaken. The assessment drew on the results of desk-based research, geophysical survey and Phase 1 of a trial trench evaluation and has been undertaken in line with relevant policy and guidance, including Planning Policy Wales (Edition 12), Technical Advice Note 24: The Historic Environment, and Cadw's Conservation Principles. The scope and methodology of the assessment has been approved by Heneb.
- 7.13.1 The completed surveys identified potential and confirmed archaeological remains within the Site, relating to possible prehistoric or Roman activity, medieval and later agriculture and First World War practice trenches within the Cable Corridor. There are no known or potential remains of remains of high value within the Site.

Construction and Decommissioning

- 7.13.2 Construction effects upon archaeological remains would be largely limited and would be subject to appropriate mitigation. These include either a programme of archaeological investigation and recording prior to intrusive construction activities, delivering benefits which



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would offset the loss of remains, or design measures (avoidance, 'no-dig' solutions). With these mitigation measures in place, no significant effects on archaeological are anticipated as a result of the Proposed Development and the provisions of local and national planning policies would be met.

Operation

- 7.13.3 Impacts upon the archaeological resource are limited to the construction phase and no further effects are anticipated during operation.



8 Climate Change

8.1 Introduction

8.1.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development on climate change. The assessment is based on the characteristics of the Site and surrounding area, as well as the key parameters of the Proposed Development detailed in **Chapter 3 – Site and Development Description**. The Chapter describes the relevant policies, assessment methodology, baseline conditions, mitigation measures and the findings of the assessment of:

- The impact of the Proposed Development on climate change ('Greenhouse Gas Emissions Assessment');
- The impact of climate change on the Proposed Development ('Climate Change Risk Assessment'); and
- In-combination climate change effects.

8.1.2 These assessments have different policy contexts, guidance documents, methodologies, baseline conditions, potential impacts and mitigation measures. This Chapter therefore presents the Greenhouse Gas (GHG) Emissions Assessment and Climate Change Risk Assessment (CCRA) separately. Following this introduction, this Chapter is structured as follows:

- **Part 1: Greenhouse Gas Emissions Assessment** – a quantitative, assumptions-based assessment of the Development's impacts on climate change by its potential to emit GHGs. This section also outlines what mitigation measures have been embedded within the Proposed Development to reduce GHG emissions during construction and operation.
- **Part 2: Climate Change Risk Assessment** – outlines the projected climatic changes in the region, identifies receptors vulnerable to climate change, and the mitigation measures to address climate change, embed adaptation measures and improve resilience as well as in-combination climate change effects.
- Summary and References.

8.1.3 This Chapter is supported by, and should be read in conjunction with the following appendices:

- **Appendix D.1:** Climate Change Policy and Guidance; and
- **Appendix D.2:** Climate Change Risk Assessment.

8.1.4 This ES Chapter should be read alongside other technical chapters within this ES including Chapter 6- Flood Risk and Water Resources, Chapter 9- Ground Conditions and Contaminated Land, Chapter 10- Biodiversity and Chapter 11- Landscape and Visual which have been submitted alongside the planning application.

8.1.5 This Chapter has been prepared by Stantec UK. In accordance with Regulation 17(4) of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017³⁸, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix A.4**.

³⁸ Welsh Government (2017). The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017. Available from: <https://www.legislation.gov.uk/wsi/2017/567/contents>



PART 1: GHG EMISSIONS ASSESSMENT

8.2 Policy Context, Legislation, Guidance and Standards

National Legislation and Policy

8.2.1 The following legislation and policy documents have informed the assessment of effects within this section. These documents highlight the need for renewable energy development in order to meet legally binding net zero targets. The Clean Power 2030 Action Plan sets a target to have a 45-47 GW capacity from solar by 2030, an increase of nearly 30 GW capacity from 2024, as part of the Government's plans to decarbonise the energy sector. Further details are provided in **Appendix D.1**.

- **International Agreements**, the Paris Agreement (2015)³⁹ including the UK's Nationally Determined Contribution (NDC) and United Nations Climate Change Conference – COP26 Glasgow (2021)⁴⁰, COP27 Sharm el Sheikh (2022), COP28 UAE (2023), COP29 Baku (2024).
- **Climate Change Legislation**, including Climate Change Act (2008)⁴¹ and 2050 Target Amendment Order 2019, Environment (Wales) Act (2016)⁴², UK Carbon Budget Orders (2009, 2011, 2016 and 2021)⁴³, Carbon Budget Orders (Wales) (2016, 2021 and 2026)⁴⁴, the Carbon Budget Delivery Plan (2023)⁴⁵, the Planning and Energy Act (England and Wales) (2008)⁴⁶, the Energy Act (2023)⁴⁷, Town and County Planning (Environmental Impact Assessment) Regulations (Wales) (2017)⁴⁸;
- **National Planning Policy**, including Planning Policy Wales (2021)⁴⁹, Prosperity for All: A Low Carbon Wales (2019)⁵⁰, Net Zero Strategic Plan (2022)⁵¹, Welsh Government Climate Emergency (2019)⁵².
- **Policy Papers**, including the 25 Year Environment Plan (2018)⁵³, Clean Growth Strategy (2017)⁵⁴, Ten Point Plan for an Industrial Revolution (2020)⁵⁵, Powering our Net Zero

³⁹ United Nations (UN) (2015). Paris Agreement. [Online] Available here: https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf

⁴⁰ United Nations Framework Convention on Climate Change (UNFCCC) (2021). Glasgow Climate Pact. [Online] Available here: https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf

⁴¹ UK Government (2019). Climate Change Act 2008. [Online] Available here: <https://www.legislation.gov.uk/ukpga/2008/27/contents>

⁴² UK Government (2016). Environment (Wales) Act 2016. [Online] Available here: <https://www.legislation.gov.uk/anaw/2016/3/contents>

⁴³ CCC (2025) The Seventh Carbon Budget Advice for the UK Government. [Online] Available here: <https://www.theccc.org.uk/publication/the-seventh-carbon-budget/>

⁴⁴ Welsh Government (2021). Climate change targets and carbon budgets. [Online] Available here: <https://www.gov.wales/climate-change-targets-and-carbon-budgets>

⁴⁵ Department for Energy Security and Net Zero (2023). Carbon Budget Delivery Plan. [Online] Available here: <https://www.gov.uk/government/publications/carbon-budget-delivery-plan>

⁴⁶ International Energy Agency (IEA) (2019). Planning and Energy Act 2008. [Online] Available here: <https://www.iea.org/policies/376-planning-and-energy-act-2008-england-and-wales>

⁴⁷ UK Government (2023). Energy Act 2023 [Online] Available here: <https://www.legislation.gov.uk/ukpga/2023/52/contents>

⁴⁹ Welsh Government (2021). Planning Policy Wales. [Online] Available here: <https://www.gov.wales/planning-policy-wales>

⁵⁰ Welsh Government (2019). Prosperity for All: A climate conscious Wales. [Online] Available here: <https://www.gov.wales/prosperity-all-climate-conscious-wales>

⁵¹ Welsh Government (2022). Welsh Government Net Zero Strategic Plan. [Online] Available here: <https://www.gov.wales/welsh-government-net-zero-strategic-plan>

⁵² Welsh Government (2019). Welsh Government climate emergency declaration. [Online] Available here: <https://www.gov.wales/welsh-government-makes-climate-emergency-declaration>

⁵³ Department for Environment, Food & Rural Affairs (DEFRA) (2018a). A Green Future: Our 25 Year Plan to Improve the Environment. [Online] Available here: <https://www.gov.uk/government/publications/25-year-environment-plan#full-publication-update-history>

⁵⁴ Department for Business, Energy & Industrial Strategy (DBEIS) (2018). Clean Growth Strategy. [Online] Available here: <https://www.gov.uk/government/publications/clean-growth-strategy>

⁵⁵ Department for Business, Energy & Industrial Strategy (DBEIS) (2020a). 'The ten point plan for a green industrial revolution'. [online] Available here: <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution>



Future (2020)⁵⁶, Net Zero Strategy (2021)⁵⁷, Clean Power 2030 Action Plan (2025)⁵⁸, North Wales Energy Strategy (2021)⁵⁹, Future Wales National Plan 2040 (2021)⁶⁰.

Local Policy

- 8.2.2 The Site lies within two administrative councils, Denbighshire County Council (DCC) and Conwy County Borough Council (CCBC). Key plans and policies are outlined below, with further details provided in **Appendix D.1**.

Denbighshire County Council

- DCC Local Development Plan 2006-2021 (Adopted June 2013)⁶¹, includes Policy VOE10 – Renewable Energy Technologies;
- DCC Renewable Energy Supplementary Planning Guidance (Adopted April 2016)⁶²;
- DCC Local Area Energy Plan (Adopted August 2024)⁶³; and
- DCC Emerging Replacement Local Development Plan 2018-2033⁶⁴

Conwy County Borough Council

- CCBC Local Development Plan 2007-2022 (Adopted October 2013)⁶⁵;
- CCBC Planning Guidance 5: Biodiversity in Planning⁶⁶;
- Planning Guidance 24: Renewable Energy⁶⁷; and,
- CCBC Local Area Energy Plan (Adopted March 2022)⁶⁸.

Climate Emergency

- 8.2.3 In April 2019, the Welsh Government declared a climate emergency and in 2021 declared a nature emergency. In July 2019, DCC declared a Climate Change and Ecological Emergency.

⁵⁶ Department for Business, Energy & Industrial Strategy (DBEIS) (2020b). Energy white paper: Powering our net zero future. [Online] Available here: <https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future>

⁵⁷ Department for Business, Energy & Industrial Strategy (DBEIS) (2022). Net Zero Strategy: Build Back Greener. [Online] <https://www.gov.uk/government/publications/net-zero-strategy>

⁵⁸ DESNZ (2025) Clean Power 2030 Action Plan. [Online] Available here: <https://www.gov.uk/government/publications/clean-power-2030-action-plan>

⁵⁹ Ambition North Wales (2021). North Wales Energy Strategy. [Online] Available here: <https://ambitionnorth.wales/media/jmmnk2u5/regional-energy-strategy-north-wales.pdf> Accessed: 20/06/2025

⁶⁰ Welsh Government (2021). Future Wales: The National Plan 2040. [Online] Available here: <https://www.gov.wales/future-wales-national-plan-2040-0>

⁶¹ Denbighshire County Council (2006). Adopted Local Development Plan [Online] Available here: <https://www.denbighshire.gov.uk/en/documents/planning-and-building-regulations/ldp/adopted-ldp/adopted-local-development-plan-2006-2021.pdf>

⁶² Denbighshire County Council (2016). Renewable Energy Supplementary Planning Guidance [Online] Available here: <https://www.denbighshire.gov.uk/en/planning-and-building-regulations/local-development-plan/supplementary-planning-guidance.aspx>

⁶³ Denbighshire County Council (2024) Denbighshire's Local Area Energy Plan [Online] Available here: <https://moderngov.denbighshire.gov.uk/mgConvert2PDF.aspx?ID=57474>

⁶⁴ Denbighshire County Council (2023) Replacement Local Development Plan 2018-2033 [Online] Available here: <https://www.denbighshire.gov.uk/en/planning-and-building-regulations/local-development-plan/replacement-local-development-plan/replacement-local-development-plan.aspx>

⁶⁵ Conwy County Borough Council (2013). Conwy Local Development Plan 2007-2022. [Online] Available here: <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Assets-written-proposals-maps/Conwy-Local-Development-Plan-2007-2022.pdf>

⁶⁶ Conwy County Borough Council (2014). LDP5 Biodiversity. [Online] Available here: <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Supplementary-planning-guidance-documents/Assets/Natural-environment/LDP5-Biodiversity-Adopted-Nov-2014.pdf>

⁶⁷ Conwy County Borough Council (2017). LDP24 Renewable Energy. [Online] Available here: <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Supplementary-planning-guidance-documents/Assets/Natural-environment/LDP24-Renewable-Energy.pdf>

⁶⁸ Conwy County Borough Council (2022). BP55: Local Area Energy Plan. [Online] Available here: <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Replacement-LDP/Stage-4-Development-of-Evidence-Base/assets/documents-RenewableEnergy/BP55-Local-Area-Energy-Plan.pdf>



Environmental Statement

Following this, DCC prepared a Climate and Nature Strategy 2021-22 to 2029-30⁶⁹ which outlines tasks DCC will complete to become Net Carbon Zero and Ecologically positive by 2030. DCC is committed to reducing emissions, whilst increasing absorption of carbon through land-use change and encourage changes in consumer habits.

- 8.2.4 In May 2019, CCBC declared a Climate Emergency and made the commitment to provide a lively, viable and sustainable home for future generations. Details regarding the Council's strategy to achieve net zero as a council by 2030 are detailed in the CCBC Net Zero Plan⁷⁰.

Technical Guidance

- 8.2.5 Several standards and guidance documents have been used to inform the GHG emissions assessment methodology and potential mitigation measures. Full details are provided in **Appendix D.1**:
- Environmental Impact Assessment (EIA) Guidance on assessing greenhouse gas emission and significance (IEMA, 2022)⁷¹;
 - Publicly Available Standard (PAS) 2080:2023 Carbon management in Infrastructure (British Standards Institute (BSI), 2023)⁷²; and,
 - World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) Greenhouse Gas Protocol guidance (WBCSD and WRI, 2004)⁷³, the 'GHG Protocol'.

8.3 Consultation

- 8.3.1 **Table 1.2** within **Chapter 2** includes Natural Resources Wales (NWR) consultation response to the Scoping Opinion, which has been fully addressed within this Chapter.

8.4 Assessment Methodology

- 8.4.1 The methodology for calculating the Proposed Development's GHG is detailed below. The metric for assessing GHG emissions in this Chapter is units of CO₂ equivalent (CO₂e).

Study Area

- 8.4.2 The GHG emissions assessment Study Area includes the Site and extends to include activities that occur beyond the Site boundary, such as manufacturing of materials. As GHG impacts are global and cumulative with all other sources of emissions, no specific geographical Study Area is defined for the identified GHG emission sources.
- 8.4.3 The scope of the GHG Emissions assessment using the PAS 2080 lifecycle stages is set out in **Table 8.2** below. The scope includes both direct (Scope 1) and indirect (Scope 2 and 3) GHG emissions as defined by the GHG Protocol (WBCSD and WRI, 2004).

Temporal Scope

- 8.4.4 The construction phase for the Proposed Development is anticipated to commence in late 2027 and to complete in 2028/2029, lasting for a period of 12-24 months. For purpose of this Chapter, the construction period is assumed to last 24 months. The assessment has been

⁶⁹ Denbighshire County Council (2022). Climate and Nature Strategy 2021-22 to 2029-30. [Online] Available here: <https://www.denbighshire.gov.uk/en/your-council/strategies-plans-and-policies/strategies/climate-and-ecological-change-strategy.aspx>

⁷⁰ Conwy County Borough Council (2024). Net Zero Plan. [Online] Available here: <https://www.conwy.gov.uk/en/Council/Strategies-Plans-and-Policies/Climate-Change/assets/documents/Conwy-CBC-Net-Zero-Plan.pdf>

⁷¹ Institute of Sustainability and Environmental Professionals (ISEP) (2022) Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition.

⁷² British Standards Institute (BSI) (2023). PAS 2080:2023 Carbon management in Infrastructure. BSI Standards Limited.

⁷³ WBCSD and WRI (2004). The GHG Protocol: A Corporate Accounting and Reporting Standard. WBCSD, Geneva and WRI, Washington DC



based on the totality of activity across the whole 24-month period. In order to assume yearly construction emissions, the total emissions during construction have been divided by two, however it is acknowledged that in reality the construction period will involve activities occurring at different rates across the 24-month period. The first operational year is anticipated to be 2029. The assessment assumes a 40-year operational life (to 2069) of all infrastructure associated with the Proposed Development.

- 8.4.5 Based on the above timescales, construction activities are assumed to fall within Carbon Budget Order 3 which lasts from 2026 to 2030. Operational emissions are assumed to start in Carbon Budget Order 3 in 2029 lasting one year of the carbon budget, where the operational emission will then enter Carbon Budget 4 which lasts from 2031 to 2035. These Carbon Budgets will be used to contextualise emissions from the Proposed Development in line with Institute of Sustainability and Environmental Professionals (ISEP, formerly IEMA) guidance. There are no Carbon Budgets currently published for beyond 2035 (the end of the recommended fourth Carbon Budget Order for Wales), although it is noted that the Proposed Development will continue to operate and be decommissioned after this point.

Baseline Data Collection

- 8.4.6 A desk-based study has been undertaken to establish the existing and future context for GHG emissions at the Site without the Proposed Development proceeding. Denbighshire, Conwy and Welsh territorial baseline GHG emissions have been identified through a review of UK local authority GHG inventory data⁷⁴.
- 8.4.7 Future baseline emissions have been sourced from the Carbon Budget Orders (Wales), indicative sectoral carbon budgets from the Carbon Budget Delivery Plan (DESNZ, 2023) and projected future pathways to meet the UK 2050 net zero target published by the Tyndall Centre for Climate Change Research for the assessed local authority area. The Tyndall Centre scales down the Welsh national Carbon Budgets (energy only) to show how each LPA can make its 'fair' contribution towards a 1.5-degree warming trajectory and net zero.
- 8.4.8 A high-level review of existing land use and associated activities on Site has been undertaken to identify the baseline GHG emissions.

Assessment

- 8.4.9 There is no nationally adopted method for assessing climate change within EIA and therefore the assessment approach draws upon ISEP guidance (ISEP, 2022). It identifies that all new GHG emissions contribute to a negative environmental impact and contribute to climate change, thus might be considered significant. It therefore suggests the impact of a development on climate should be based on its potential to emit GHGs and whether it contributes to reducing GHG consistent with a trajectory towards net zero by 2050.
- 8.4.10 The GHG emissions assessment has been based on the parameters of the Proposed Development. A review has also been undertaken of relevant reports that will be submitted with the planning application. Where information from reporting outside the ES has been considered, all relevant information to inform the assessment of likely significant effects on the environment has been summarised within this Chapter.
- 8.4.11 ISEP guidance emphasises the need for proportionality in the context of national, sector and local GHG emissions. As detailed in **Table 8.1**, several activities have been assessed quantitatively. Where detailed information is not available, a qualitative appraisal has been undertaken, and recommendations are made to limit effects associated with the construction and operational phases of the Proposed Development.

⁷⁴ DESNZ (2025b) 2024 UK Greenhouse Gas Emissions, Provisional Figures. [Online] Available here: <https://assets.publishing.service.gov.uk/media/67e4060df356a2dc0e39b4cd/2024-provisional-greenhouse-gas-emissions-statistics-statistical-release.pdf>



Environmental Statement

8.4.12 The sources of emissions that are considered within this assessment, in line with ISEP Guidance, are discussed in **Table 8. 1**.

8.4.13 The GHG Protocol (WBCSD and WRI, 2019) categorises direct and indirect emissions into three broad scopes:

- Scope 1: all direct GHG emissions;
- Scope 2: indirect GHG emissions from the generation of purchased electricity, heat, or steam; and
- Scope 3: other indirect emissions, such as the extraction and production of purchased materials and fuels, electricity-related activities not covered in Scope 2, outsourced activities, waste disposal, etc.

8.4.14 In addition, PAS 2080 (BSI, 2023) defines lifecycle modules. The scope of the GHG Emissions assessment using the GHG Protocol and PAS 2080 lifecycle stages is set out in **Table 8.1** and **Appendix D.1**.

Table 8.1: GHG Emissions Sources and Assessment Scope (PAS 2080)

PAS 2080 Lifecycle Stages	Emissions and Activities Assessed	Emission Scope
Construction		
A1- A3 Product Stages	Embodied carbon from purchased materials required to construct the Proposed Development.	Scope 3
A4 Transport to Works Site	Transport of construction materials and plant to Site, including shipping where relevant. Construction staff commuting to Site.	Scope 1 and Scope 3
A5 Construction – Installation Process	Construction process emissions resulting from the combustion of fuels in the Applicant's owned/controlled vehicles, plant, or equipment used for construction of the Proposed Development.	Scope 1 and Scope 3
	Emissions associated with electricity from off-site generation needed for plant and welfare facilities will come from a mains connection during construction. All other equipment emissions associated with power will come under fuel use (see above).	Scope 2
Operation		
B1 Use	A qualitative assessment of carbon sequestration associated with landscaping and green infrastructure.	Scope 1 and Scope 3
	A quantitative assessment of emissions associated with operational waste disposal and water usage.	
B2-B5 Maintenance, Repair, Replacement, Refurbishment	Embodied carbon and transport emissions from purchased materials and onsite fuel use required for maintenance.	Scope 1 and Scope 3
B6 Operational Energy Use	Emissions associated with purchased electricity from the National Grid and distribution network during operation of the Proposed Development. Emissions associated with on-Site energy generation from solar panels.	Scope 2



B7 Operational Water Use	Emissions associated with clean water supply for use and treatment of wastewater.	Scope 3
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- 8.4.15 Carbon sequestration from land change of agricultural land to the Proposed Development was considered in the baseline GHG assessment. However, a quantitative assessment of land disturbance and habitat planting was not included within the GHG Assessment. There will be minimal earth works or soil disturbance during construction of the Proposed Development due to the minimally invasive nature of the Proposed Development, therefore a conservative approach of the GHG assessment does not consider these emissions. During the operation of the Proposed Development the habitats will be retained and enhanced and are anticipated to sequester carbon, however, to provide a conservative assessment, carbon sequestration during operation has not been considered in the GHG assessment.
- 8.4.16 The decommissioning phase of the Proposed Development was not considered quantitatively in the GHG assessment. Decommissioning activities will occur in more than 40 years, where technology and methodologies for decommissioning are not yet known. Additionally, decommissioning will be conducted after the 2050 net zero legally binding target for Wales. Therefore, it can be reasonably assumed that the decommissioning activities for the Proposed Development will be conducted in line with net zero, as compliant with national policy.

Construction Vehicle GHG Emissions – Calculation Methodology

- 8.4.17 Transport emissions have been calculated using UK Government conversion factors as published by DESNZ (2025) and the distance travelled for construction workers, shipment of materials and Heavy Goods Vehicles (HGVs) withdrawn from the Transport Statement (Stantec, 2025).
- 8.4.18 Emission conversion factors for ‘Car medium size’ has been applied to average distance travelled and total worker numbers to calculate GHG emissions associated with worker transport. The distance travelled is assumed to be 30 km based on RICS guidance assumption for ‘local’ trips⁷⁵.
- 8.4.19 It is anticipated that some infrastructure/materials supporting the Proposed Development, such as PV panels, will be sourced from China. It is unlikely that all materials will be sourced from China, however for the purpose of this assessment, that has been assumed to be the case to enable a conservative approach. The assessment is therefore likely to overestimate the emissions from transporting materials to Site. HGV and sea freight distances assumed for transportation of materials and waste are as follows:
- 150 km as the average distance from manufacturing centres in China to the nearest shipping port in Shanghai;
 - 21,880 km sea freight distance from China to England (based on sea freight distance between Shanghai and Holyhead); and
 - 87 km distance from Holyhead (the closest port to the Site) to Bodelwyddan.
- 8.4.20 For HGV transportation of materials, the UK Government GHG 2025 Conversion Factors for Rigid HGV >7.5-17t and Articulated HGV >3.5-33t have been applied. It has also been assumed that 50% of HGVs are Laden and another 50% are rigid.

Embodied Carbon – Calculation Methodology

⁷⁵ RICS (2017). WLCA. [Online] Available here: <https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/construction-standards/whole-life-carbon-assessment>



Environmental Statement

- 8.4.21 Embodied carbon has been based on the materials which comprise solar PV, BESS, inverters, transformers and the cable route. Embodied Carbon has been calculated against the total amount of infrastructure and embodied carbon per material (DESNZ, 2025)⁷⁶.
- 8.4.22 The embodied carbon calculations do not account for the construction of roads and infrastructure, as detailed information on material quantities is not available.

Construction Fuel GHG Emissions – Calculation Methodology

- 8.4.23 Construction process emissions resulting from the combustion of fuels in the Applicant's owned/controlled vehicles, plant, or equipment used for construction of the Proposed Development have been calculated using construction plant fuel consumption provided by the Applicant, and the Government GHG conversion factors 2025 (DESNZ, 2025).
- 8.4.24 A worst-case assumption that the construction activities will be carried out Monday to Friday 07:00 – 18:00, between 07:00 and 13:30 on Saturdays plant (excluding Sundays and bank holidays), for the 24-month construction period.

Operational Vehicle GHG Emissions – Calculation Methodology

- 8.4.25 To calculate the operational vehicle GHG emissions, it is assumed that 2 trips will occur a month with an average of 30 km distance travelled.
- 8.4.26 The Proposed Development's yearly operational vehicular GHG emissions are calculated by comparing the difference in the emissions for the 2029 future baseline scenario and operational phase sensitivity scenario.

Operational Energy Use GHG Emissions – Calculation Methodology

- 8.4.27 Operational energy has been calculated based upon information provided by the Applicant which estimated the energy consumption of the security and office on Site.
- 8.4.28 The Proposed Development has been assumed to experience a 2% degradation factor in the first year of energy generation, followed by a 0.45% degradation factor for each year of operation until replacement occurs.

Contextualisation of GHG Emissions

- 8.4.29 The Proposed Development's yearly GHG emissions have been multiplied by the number of years the Proposed Development will be operational within each carbon budget, in order to estimate the Proposed Development's contribution towards the carbon budgets.
- 8.4.30 The assessment will also calculate the carbon intensity of the Proposed Development (tCO₂e/kWh) using the net lifetime emissions and the anticipated export of energy (KWh) across the 40-year operational stage. This figure has been contextualised against the forecasted National Grid average GHG intensity for the anticipated energisation year of 2029 for the Proposed Development.

Sensitive Receptors

- 8.4.31 GHG emissions have a global effect rather than directly affecting specific local receptors to which levels of sensitivity can be assigned. The global climate has therefore been treated as a single receptor. Given the global scale and severe consequences of climate change and limited recoverability, the receptor sensitivity is considered to be high.

⁷⁶ DESNZ (2025a) 2023 UK Greenhouse Gas Emissions, Final Figures. [Online] Available here: <https://assets.publishing.service.gov.uk/media/67a30e4f7da1f1ac64e5feb1/2023-final-greenhouse-gas-emissions-statistical-release.pdf>



Determining Significance

- 8.4.32 There is an absence of a defined threshold for determining the significance of effects resulting from GHG emissions in EIA. Significance of effects have therefore been determined using professional judgement, and consideration of the following elements:
- ISEP EIA Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (ISEP, 2022).
 - Appraisal of the Proposed Development's emissions in the context of national, regional and local emissions through establishing the current and future baseline. This includes how the Proposed Development meets legally binding targets for net zero, provides renewable energy generation and supports decarbonisation of the National Grid.
 - How the Proposed Development has embedded design features to reduce GHG emissions and identified opportunities for further mitigation in the Proposed Development's design and delivery.
- 8.4.33 ISEP guidance (ISEP, 2022) identifies three underlying principles to inform the assessment of significance and conclude that:
- *"The GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect"*
 - *"The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive (e.g. human health, biodiversity, water, land use, air quality)"*
 - *"GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit; as such any GHG emissions or reductions from a project might be considered to be significant."*
- 8.4.34 Key to determining significance is setting a context for the magnitude of GHG emissions. The relevant context here are the national carbon budgets which defines a level of GHG emissions that would result in dangerous climate change. The UK has set a legally binding GHG reduction target for 2050 which, according to the Climate Change Committee (CCC), is compatible with the magnitude and rate of GHG emission reductions required in the UK to meet the goals of the Paris Agreement.
- 8.4.35 Given this, ISEP guidance states that "the crux of significance is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050."
- 8.4.36 **Appendix D.1** sets out the background to significance with regards to policy requirements including the Paris Agreement and 2050 Target.
- 8.4.37 This assessment has applied the following significance criteria set out in **Table 8.2** that is set out in the ISEP guidance (ISEP, 2022). Major or moderate adverse effects and beneficial effects are considered to be 'significant'. Minor adverse and negligible effects are considered to be 'not significant'. Substantial weight should be given to the environmental benefits of the Proposed Development, notably the contribution it would make towards UK energy climate change legislation and policy and the legally binding target of Net Zero by 2050, particularly given the scale and urgency of the need to deliver more low carbon renewable electricity generation both locally and nationally.



Table 8.2: GHG Significance (ISEP, 2022)

Significance	Measure of Impact
Major Adverse	the project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
Moderate Adverse	the project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
Minor Adverse	the project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
Negligible	the project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions
Beneficial	the project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

Cumulative Effects

8.4.38 ISEP guidance (ISEP, 2022) identifies that all global cumulative GHG sources are relevant to the effect on climate change. This is taken into account in defining the receptor as being of high sensitivity to further emissions. For this reason, the guidance recommends that effects of GHG emissions from specific cumulative projects should not be individually assessed, as there is no basis for selecting particular cumulative projects that have GHG emissions over others. By its nature, the contextualisation of GHG emissions to the national carbon budgets incorporates cumulative contributions of other GHG sources which make up that context. Therefore, a separate cumulative assessment has not been undertaken for the GHG assessment.

Limitations and Assumptions

- 8.4.39 The assessment of GHG emissions is based on available best practice information. The findings presented in this chapter are based on the information available at the time of writing and based on emerging design.
- 8.4.40 Assumptions have been made to generally reflect a realistic worst-case scenario.
- 8.4.41 Carbon factors and future emissions are based on the best available data which aim to provide the best estimate through professional judgement. As noted above, carbon factors have been attained from industry accepted sources including UK Governments Carbon Factors and Natural England Carbon Factors⁷⁷ (as NRW does not have an equivalent resource).
- 8.4.42 The trajectory of GHG emissions to inform the future baseline is dependent on external factors such as Government policy and technology and economic shifts, which are difficult to predict.

⁷⁷ Natural England (2021). Carbon Storage and Sequestration by Habitat. [Online] Available here: <https://publications.naturalengland.org.uk/publication/5419124441481216>



The Carbon Budget Orders are legally binding, and the Welsh Government has an array of policies and levers to be deployed if the Carbon Budgets are not likely to be met. It is reasonable to assume in the future baseline the UK economy is decarbonising without the Proposed Development based on this legal context.

- 8.4.43 There are inherent assumptions and limitations associated with local carbon budgets produced by the Tyndall Centre. For example, the local budgets do not downscale aviation and shipping emissions from the UK national level, resulting in a limitation in terms of contextualisation against local carbon budgets that account for a different scope of emissions. In summary, the assessment presented in this chapter will account for shipping emissions and emissions outside of the UK. Comparison of the Proposed Development’s emissions against the local carbon budgets produced by the Tyndall Centre therefore provides a conservative approach.
- 8.4.44 The construction of the Proposed Development is proposed to be over a 24-month period and subject to the DNS consenting process, the earliest construction is anticipated to start in late 2027. This is expected to be a realistic worst-case assumption for the assessment of the Proposed Development, as it represents the expected maximum build time and therefore the maximum total emissions and impacts occurring as a result of the construction phase.

8.5 Baseline Conditions

Current GHG Emission Baseline

National and Regional Emissions

- 8.5.1 This section establishes the existing GHG emissions at a national and regional level. GHG emissions do not have a local receptor as, once they are emitted, they are not limited to geographic boundaries.
- 8.5.2 The Climate Change Act 2008, as amended, requires the UK government to set five-yearly carbon budgets, after taking advice from the Committee on Climate Change (CCC). The budgets are fixed in advance and set five-year caps on the total GHG emissions allowed to ensure emission reduction commitments are met. Carbon budgets specific to Wales were established as a result of the Environment (Wales) Act 2016.
- 8.5.3 The carbon budgets enable net increases in emissions to be managed within the carbon budgets by balancing with performance in other sectors. Governments can use an array of policies and levers to achieve the net reductions necessary to meet the carbon budgets whilst taking an economy-wide and national approach to securing overall emissions reductions whilst facilitating other objectives including economic growth, energy security and levelling up. This assessment has considered the Carbon Budget Orders specific to Wales, which were decided on by Welsh Ministers appointed to Senedd Cymru and secured through the Climate Change (Carbon Budgets) (Wales) Regulations 2018. Welsh Carbon Budgets from 2008 to 2037 are outlined in **Appendix D.1**.
- 8.5.4 **Table 8.3** sets out the Carbon Budgets for Wales from 2016 to 2025. Carbon Budget 1 (2016-2020) and the associated 2020 interim target were exceeded, with an average emissions reduction of 27.8%. Carbon Budget 2 is due to culminate in 2025.

Table 8.3: Carbon Budget (Wales) (2016-2025)

Welsh Carbon Budget	Amount
Carbon Budget 1 (2016-2020)	Average 23% reduction
Carbon Budget 1 International Offset Limit	10%



Carbon Budget 2 (2021-2025)	Average 37% reduction
Carbon Budget 2 International Offset Limit	0%

- 8.5.5 In the context of the UK, total net territorial GHG emissions were estimated to be 385 million tonnes carbon dioxide equivalents (MtCO₂e), a decrease of 5% compared to 2022 (DESNZ, 2025) mainly due to a decrease in gas use in electricity supply. UK territorial GHG emissions in 2023 were 53% lower than they were in 1990 (DESNZ, 2025). Provisional figures for 2024 show an estimate of 371 MtCO₂e, a decrease of 4% from the 2023 due to decreased gas and coal in the electricity supply (DESNZ, 2025).
- 8.5.6 In the context of Wales, total net territorial GHG emissions were estimated to be 34.1 million tonnes carbon dioxide equivalent (MtCO₂e) in 2023, a decrease of 0.6% compared to 2022 (Welsh Government, 2024a).
- 8.5.7 The Department for Energy Security and Net Zero (DESNZ, 2025) sets out the territorial CO₂e emission estimates from a number of sources for 2005-2023 and is the most up to date available figures for the UK, Wales, Denbighshire and Conwy. The CO₂e estimates for 2023 are presented in **Table 8.4** below.

Table 8.4: National, Wales, Denbighshire and Conwy CO₂e estimates for 2023

	UK Total (ktCO ₂ e)	Wales Total (ktCO ₂ e)	Denbighshire (ktCO ₂ e)	Conwy (ktCO ₂ e)
Industry	56,675	8,676	32.3	14.1
Commercial	35,590	1,240	36.7	38.9
Public Sector	10,380	475	21.2	17.3
Domestic	76,897	3,757	120.2	141.7
Transport	113,307	5,864	170.9	240.9
Land Use, Land Use Change and Forestry	1,120	-629	-29.5	-45.4
Agriculture	48,288	5,190	260.6	270.8
Waste	19,838	916	14.1	16.6
Total	356,094	25,490	649.4	744.9

- 8.5.8 Based on the values in **Table 8.4**, Denbighshire and Conwy account for approximately 2.5% and 2.9% of the total CO₂e emissions in Wales and 0.18% and 0.21% of the total CO₂e emissions in the UK, respectively. The largest source of emissions within Denbighshire is agriculture (40.12%), followed by transport (26.32%) and then domestic (18.51%). The largest sources of emissions within Conwy are agriculture (36.35%), followed by transport (32.348%) and then domestic (19.02%).
- 8.5.9 Beyond the Site boundary there are existing GHG emissions from the generation of National Grid electricity. Electricity from the National Grid includes a mix of sources such as gas, nuclear and renewable energy. This is relevant to this assessment as the nature of the Proposed Development contributes towards the generation of renewable energy production. The carbon intensity of the National Grid in 2024 was 0.125 kgCO₂e/kWh (NESO, 2025)⁷⁸.

⁷⁸ National Energy System Operator. Britain's Electricity Explained 2024 Review. [Online] Available here: <https://www.neso.energy/news/britains-electricity-explained-2024-review>



Local Emissions

- 8.5.10 The Site comprises approximately 159.3 ha of agricultural land. There are GHG emissions associated with agricultural practices produced on Site. These include GHG emissions associated with crop fertilisation, soil-based emissions from disturbing soils, and waste produced as a result of farming processes and other activities.
- 8.5.11 The hedgerows, scrub and trees on Site and surrounding the boundaries of the Site provide a limited amount of carbon sequestration.
- 8.5.12 The Cable Corridor once constructed, will be located primarily beneath the ground under agricultural fields. The Cable Corridor will also intersect with existing road infrastructure. Soils are a store of GHG emissions and were there any need for roadworks this would add to the release of carbon into the atmosphere. There are no areas of peat located within the Site, along the Cable Corridor, or in the surrounding area which changes the levels of carbon potentially being released from the soils.
- 8.5.13 Baseline emissions for the current agricultural use of the Site in relation to the exchange of carbon from between the atmosphere and the soil are estimated to emit 46 tCO₂e per annum. This figure does not account for emissions associated with other agricultural activities, for example fuel use for equipment. It is therefore likely that this figure is an underestimation of current Site emissions.

Future Baseline

National and Regional Emissions

- 8.5.14 This section summarises the future carbon budgets for Wales and the UK. It also summarises modelled or projected future scenarios and pathways to net zero published by the Tyndall Centre for Climate Change Research and how they provide appropriate future baselines to meet the UK 2050 net zero target. Future baselines have been modelled using the wider UK Carbon Budgets, as available sources are more-widely available than Welsh Carbon Budget Orders.
- 8.5.15 The future carbon budgets and interim targets for Wales, as set out in **Table 8.5** below, are the next milestones on Wales's pathway to net zero. This pathway is in line with the Welsh Government's Net Zero Strategic Plan and secured through The Climate Change (Interim Emissions Targets) (Wales) (Amendment) Regulations 2021.

Table 8.5: Welsh Carbon Budgets (2026-2050)

Budget/Target	Amount
Carbon budget 3 (2026-2030)	Average 58% reduction
2030 interim target	63% reduction
Recommended* Carbon budget 4 (2031-2035)	Average 73% reduction
2040 interim target	89% reduction
2050 interim target	At least 100% reduction (net zero)

- 8.5.16 The UK Government has published the Carbon Budget Delivery Plan (CBDP) (DESNZ, 2023) which sets out detailed proposals to enable the delivery of the fourth, fifth and sixth Carbon Budgets. The CBDP provides indicative projections of sectoral based residual emissions, based on an adjusted version of the Government's Energy and Emissions Projections, which apply assumptions of future economic growth, fossil fuel prices, electricity generation costs,



UK population growth and other key variables. **Table 8.6** sets out the projected emissions for the Power sector, which is considered to be the most relevant to the Proposed Development.

Table 8.6: Power Sector Residual Emissions Across Carbon Budgets (MtCO₂e) from the Carbon Budget Delivery Plan

Sector	Current (2021, per annum (pa))	4 th Carbon Budget 5-yr (average pa)	5 th Carbon Budget 5-yr (average pa)	6 th Carbon Budget 5-yr (average pa)
Power	54	143 (29)	63 (13)	42 (8)

8.5.17 **Table 8.7** below presents the Tyndall Centre Denbighshire and Conwy energy CO₂ only indicative budget in the format of the 5-year carbon budget periods in the UK Climate Change Act.

Table 8.7: Denbighshire and Conwy Indicative Carbon Budgets (Source: the Tyndall Centre Carbon Budget Tool)

Carbon Budget	Denbighshire recommended budget level (million tonnes carbon dioxide equivalents – MtCO ₂)	Conwy recommended budget level (million tonnes carbon dioxide equivalents – MtCO ₂)
3 rd (2018-2022)	2.1	2.4
4 th (2023-2027)	1.0	1.2
5 th (2028-2032)	0.5	0.6
6 th (2033-2037)	0.2	0.3
7 th (2038-2042)	0.1	0.1

8.5.18 The UK Government and the Welsh Government have published several national strategies that are intended to aid the reduction of emissions in line with the legally binding carbon budgets and the 2050 net zero target. The strategies that are considered to have relevance to the Proposed Development are set out in further detail in **Appendix D.1**. A summary of how these policies are anticipated to influence sector emissions, without the Proposed Development, is provided below:

- The Welsh Government has committed itself to addressing the impacts from the power sector on the changing climate. Primary aims of Wales's policy-base include ending the reliance on fossil fuels and for future development to contribute to reducing global CO₂ emissions. National priorities include accelerating the transition away from reliance on fossil fuels and towards renewable energy to power Welsh industry, businesses and homes. This is outlined explicitly in the Future Wales plan and weight is given to developing renewable energy demands (DCW, 2023).
- The National Grid is currently decarbonising, which is anticipated to continue over the next decade. This is an outcome of the continued uptake of renewable energies and the decline of coal-fired power stations across the UK. The increasing share of low carbon, renewable energy sources with a corresponding decrease in the use of fossil fuels, is termed 'decarbonisation'. This change is significant as it encourages the use of grid-supplied electricity systems such as air source heat-pumps, over gas-fired plants. The 2029 future national grid intensity carbon factor is projected to be 0.049 kgCO₂e/kWh and by 2069 this could be 0.002 kgCO₂e/kWh (DESNZ, 2023)⁷⁹.

8.5.19 The development of renewable electricity projects such as this one are critical enablers of decarbonisation and must continue with pace to achieve the policy objectives associated with

⁷⁹ Department for Energy Security & Net Zero (2023). Valuation of Energy Use and Greenhouse Gas Emissions. [Online] Available here: <https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fassets.publishing.service.gov.uk%2Fmedia%2F6567994fcc1ec5000d8eef17%2Fdata-tables-1-19.xlsx&wdOrigin=BROWSELINK>



the Welsh and UK Net Zero 2050 target. In other words, the decarbonisation of other sectors, such as surface transport and domestic heating, relies on the ability to decarbonise electricity generation. The UK Government's target to achieve solar capacity of 45-47 GW by 2030 has been forecast to be missed by approximately 16 GW⁸⁰. The national pipeline of consented solar developments is not of sufficient scale nor certainty to keep pace with even the lowest of the most recent projections of the future solar generation capacity and timings to meet Net Zero by 2050. For Wales, deployment of 3-5 GW of solar is required by 2035⁸¹ to support the Welsh Government target for 100% electricity consumption to be generated by renewable energy. This implies that more solar capacity must be consented in the UK in order to deliver the UK's Net Zero target.

Local Emissions

- 8.5.20 If the Site continues in its current use, there would be ongoing emissions from agricultural uses. The Site would likely sequester carbon at its current rate, although vegetation would mature. Future baseline emissions are considered to remain similar to that of current Site conditions.
- 8.5.21 Over a period of 42 years (the anticipated combined construction and operation period for the Proposed Development), the baseline emissions from the current agricultural use of the Site are estimated to be 1,940 tCO₂e. As noted in **Section 8.5.13**, this figure is likely to underestimate the baseline emissions on Site as this does not account for emissions associated all agricultural activities.

8.6 Primary and Tertiary Mitigation

Primary Mitigation

Construction

- 8.6.1 A connection to the National Grid will be used for the temporary office and welfare building supply for the 24 months of construction. Construction will be conducted in accordance with local and national policy to reduce GHG emissions where possible.

Operation

Energy

- 8.6.2 During operation, the Proposed Development will generate renewable electricity from solar irradiation and export this to the National Grid. BESS is included in the Proposed Development which will store energy for use at peak times and help to reduce the reliance on fossil fuel energy generation sources that are typically used to meet peak demand. The generation of renewable electricity is considered to be primary mitigation as this will contribute to the decarbonisation of the National Grid.

Green Infrastructure

- 8.6.3 Development of habitats of ecological value within the Site, including woodlands, hedgerows and watercourses, will be avoided or minimised, with infrastructure development focused on existing agricultural land and specifically designed to assimilate within the existing land, so as to avoid removal of hedgerows and trees. The Landscape and Ecology Strategy will deliver 2,265m of hedgerow enhancement, 8,204m of new hedgerows and 160 new trees. Furthermore, the Strategy will deliver an ecological mitigation and enhancement area measuring approximately 10ha will be created to the west of Kinmel Avenue area of restored ancient woodland site. This ecological area will be designed to support breeding and foraging

⁸⁰ Cornwall Insight (2025) Government projected to miss revised Clean Power 2030 targets by 32GW. Accessed Online here: <https://www.cornwall-insight.com/press-and-media/press-release/government-projected-to-miss-revised-clean-power-2030-targets-by-32gw/>

⁸¹ Renewable UK (2025) Unleashing the Full Value of Welsh Renewables. [Online] Available here: <https://www.renewableuk.com/media/yhxi3n1v/2329-renewable-energy-in-wales-report.pdf>



habitats for farmland and wetland birds such as skylark, teal, and other farmland and migratory species. This green infrastructure and ecological mitigation and enhancement area will help reduce GHG emissions retaining carbon stores in mature vegetation with new planting locations which, taken together, will provide a substantially greater potential to store carbon than at present.

Tertiary Mitigation

Construction

- 8.6.4 An outline Construction Environmental Management Plan (oCEMP) (**Appendix A.5**) will be submitted alongside the planning application. The oCEMP will include mitigation measures covering transport, materials, waste and air quality during construction. Measures that will reduce GHG emissions during construction include, for example, no unnecessary idling of engines, maintenance of plant equipment so that they are operating optimally, and efficient use of materials to reduce waste. The measures included in the oCEMP will contribute to the mitigation of GHG emissions by reducing energy consumption and waste/pollutant generation during construction, thereby leading to a lower carbon footprint for the Proposed Development.
- 8.6.5 A Construction Traffic Management Plan (CTMP) will be submitted for the planning application. The CTMP will set out the routing plans for working and deliveries, scheduling and timing of deliveries, and logistics plans. This will help to improve the efficiencies of vehicle movements during construction. As a result, GHG emissions associated with construction traffic will be reduced.

Operation

- 8.6.6 An outline Landscape and Ecology Management Plan (oLEMP) will be submitted with the planning application to manage the planting on Site which is shown on the submitted Illustrative Landscape and Ecology Strategy (**Appendix A.9**). The oLEMP will provide maximum biodiversity benefits are delivered from the planting strategy.

8.7 Assessment of Likely Significant Effects

Construction Phase

A1-A3 Product Stage

- 8.7.1 A1-A3 product stage includes embodied emissions from raw materials supply and transport within the supply chain required to construct the Proposed Development. Embodied carbon emissions result from extracting raw materials, processing them, assembling them into usable products and transporting them to Site during construction. It is noted that a large proportion of GHG emissions from a development may be accounted for within Scope 3 embodied carbon. The embodied carbon associated with the Proposed Development will be heavily influenced by the type and amount of material required to construct the Proposed Development. Extraction and production processes can be carbon intensive, particularly for materials such as concrete. It is also noted that embodied carbon is heavily influenced by available materials and supply chains in the local and wider area.

Solar PV Panel

- 8.7.2 The solar PV panel comprises multiple modules. The total weight of an individual tracker panel is anticipated to be 38.3 kg and have approximately 156 individual solar cells. The primary materials which will comprise the solar panels are silicon (11g), glass (27.13g) and steel



(9.45g) (Brand et al., 2019)⁸². Embodied carbon factors of the materials were withdrawn from DESNZ, 2025.

Transformers, Inverters and Switchgear

- 8.7.3 The transformers, inverters and switchgear which support solar PV panels on Site comprise steel (61%), copper (16%), plasterboard (4%) and oil (19%) (Hegedic, et al., 2016)⁸³. The embodied carbon factors are the following (DESNZ, 2025):
- Silicon: 6 kg CO₂e/kg;
 - Glass: 1.4028 kg CO₂e/kg; and
 - Steel: 2.71 kg CO₂e/kg.
- 8.7.4 Mounting equipment of the solar panel will be approximately 30 tonnes per MW of steel as per the Applicant's consultation with Solarport.

BESS

- 8.7.5 The Applicant has undertaken consultation with LeClanche battery suppliers to estimate the embodied carbon of a BESS. A value of 100 kgCO₂e per kWh was provided as a realistic worst case for the purposes of the assessment. The assessed MWh battery storage for the Proposed Development has been provided as 440 MWh.

Cables

- 8.7.6 The Cable Corridor is estimated to be approximately 8 km in length and will be made of copper (21kg/m), aluminium (10.70kg/m) and polyethylene (0.30kg/m) (Brand et al., 2019). The embodied carbon factors are as follows: (DESNZ, 2025)
- Copper: 2.71 kg CO₂e/kg
 - Aluminium: 6.67 kg CO₂e/kg
 - Polyethylene: 2.54 kg CO₂e/kg
- 8.7.7 **Table 8.8** below sets out the carbon emissions calculated for the A1-A3 Product Stage. The main source of embodied carbon is from the BESS and solar PV panels. It should be noted that the embodied carbon emissions calculated only account for the uses detailed in the table below, and do not account for the construction of roads and other infrastructure.

Table 8.8: Carbon Emissions from A1-A3 Product Stage

Product	Embodied Carbon (t/CO ₂ e)
Solar PV Panels	9,460
Transformers, Inverters and Switchgear	43
BESS	44,000
Cable Route	1,032
Total	56,643

⁸² Brandt, B., Kletzer, E., Pilz, H., Hadzhiyska, D. and Seizov, P. (2019) Silicon-Chemistry Carbon Balance An assessment of Greenhouse Gas Emissions and Reductions EXECUTIVE SUMMARY Covering the Production, Use and End-of-Life of Silicones, Siloxanes and Silane Products in Europe, North America and Japan. Available at: https://www.silicones.eu/wp-content/uploads/2019/05/SiL_exec-summary_en.pdf

⁸³ Hegedic, M., Opetuk, T., Dukic, G. and Draskovic, H. (2016) Life Cycle Assessment of Power Transformer – Case Study.



A4 Transport to Works Site

- 8.7.8 A4 transport to works site includes emissions from fossil fuels during the transportation of building materials and waste by Heavy Goods Vehicles (HGV) and construction staff commuting to and from the Site.
- 8.7.9 The construction vehicle GHG emissions are calculated estimating the distance from the factory to Shanghai port as 150 km with 50% articulated and 50% rigid HGV vehicle movements. 1,125 vehicle movements for 50% articulated and 50% rigid HGVs. A distance of 87 km from the Holyhead port to the Site is used to calculate the transport emissions. It is assumed again that 50% of HGVs are rigid and 50% are articulated, with 1,125 trips for each. Embodied carbon factors were used from DESNZ, 2025.

Table 8.9: Construction Vehicle Emissions

	Number of Trips	Distance	Kg CO _{2e} /km	tCO _{2e}
Holyhead to Site HGV 50% Articulated	1,125	87	0.37029	36
Holyhead to Site 50% Rigid	1,125	87	0.86921	85
Factor to Port HGV 50% Articulated	1,125	150	0.37029	62
Factory to Port HGV 50% Rigid	1,125	150	0.86921	147
Total				331

Construction Worker Vehicle Movements

- 8.7.10 As derived from the Transport Statement (Stantec, 2025), the construction of the Proposed Development will generate 84 trips daily during peak construction. A distance of 30 km is assumed as a local trip based on RICS Guidance. It's considered that 0 of these trips will be by shuttle bus to have a conservative worst-case assessment. Therefore, embodied carbon was utilised from DESNZ, 2025 as a medium size, petrol car. **Table 8.10** shows the total emissions generation from construction workers over the 24-month construction period.

Table 8.10: Construction Worker GHG Emissions

Number of Trips	Distance (km)	KgCO _{2e} /km	tCO _{2e}
28,080	30	0.75592	637

Shipping of Materials

- 8.7.11 It has been estimated the total emissions which will arise from shipping the above elements of the Proposed Development. This estimation has been made based off of that all products would come from China and be shipped to Holyhead, equating in a distance of nearly 21,880 km. Assuming a carbon factor of 0.01321 kgCO_{2e}/tonne/km for an average cargo ship (DESNZ, 2025), this would result in 2,822 tCO_{2e} from the shipment of materials.



Environmental Statement

- 8.7.12 A5 construction – installation includes construction process emissions resulting from the combustion of fuels in the Applicant's owned/controlled vehicles, plant, or equipment used for construction of the Proposed Development.

A5 Construction – Installation

- 8.7.13 A5 construction – installation includes construction process emissions resulting from the combustion of fuels in the Applicant's plant or equipment used for construction of the Proposed Development. This includes the emissions associated with construction water, waste and energy.

Waste

- 8.7.14 Waste streams during the construction phase which have been assessed for their greenhouse gas emissions include sewage waste.
- 8.7.15 Sewage waste generating during the 24-month construction period has been estimated at 4,400 m³. Using the carbon factor for wastewater treatment emissions collected from the UK Government GHG Conversion Factors for Company Reporting (DESNZ, 2025), the total emissions from sewage waste has been calculated at 0.82 tCO₂e.

Water Use

- 8.7.16 Water use has been provided for:
- Water consumed for construction and cleaning of HGV, solar PV panels and other equipment in litres; and
 - Potable and non-potable water for drinking and sanitary purpose in litres.
- 8.7.17 The carbon factor for water supply emissions has been collected from the UK Government GHG Conversion Factors for Company Reporting (DESNZ, 2025).

Table 8.11: Construction Water Use Emissions

Water use during construction / 24 month (million litres)	Water supply emissions (kgCO ₂ e/million litres)	tCO ₂ e/ construction phase
6	153.11	0.92

Energy Use

- 8.7.18 The temporary construction office, welfare facilities, and temporary lighting on the Site will require electricity purchased from the National Grid. This will result in indirect GHG emissions generated from off-Site energy generation that comprises a mix of sources to deliver electricity to the National Grid. Construction of the Proposed Development is anticipated to come forward as the National Grid continues to decarbonise.
- 8.7.19 Electricity for temporary security on the Site during the construction phase and electricity for office cabin and welfare centres has been estimated for the construction phase.

Table 8.12: Energy Usage during Construction Phase Emissions

Total energy usage (kWh)	Total kg CO ₂ e per kWh (DESNZ, 2024)	tCO ₂ e over construction phase
231,000	0.1770	41



Construction Emissions Summary

- 8.7.20 **Table 8.13** below summarises all of the carbon emissions calculated for the construction phase. As shown in **Table 8.13**, the construction phase emissions across the 24-month programme are estimated to be 56,229 tCO₂e.

Table 8.13: Construction Emissions Summary

Lifecycle Stage	tCO ₂ e
A1-A3 Product Stage	56,643
A4 Transport to Works Site	3,788
A5 Construction-Installation	43
TOTAL CONSTRUCTION (24-month programme)	56,644
AVERAGE CONSTRUCTION EMISSIONS PER MONTH	2,360

Significance of Effect

- 8.7.21 It is considered that the construction of the Proposed Development has the potential for temporary (for the duration of construction activities) **Moderate Adverse**, and therefore **Significant** GHG effects. The construction activities do not align with decarbonisation for a 2050 net zero trajectory. However, the construction period will only occur over a 24-month period and therefore will only cause **Temporary** effects.

Operational Phase

B1 Use

- 8.7.22 The operational phase of the Proposed Development will generate emissions from sewage waste, approximately 320 m³ per year. Assuming a carbon factor of 0.18574 tCO₂e/m³, the Proposed Development will generate approximately 60 tCO₂e per annum, and 2,377 tCO₂e from sewage waste over the 40-year operational period.

B2-B5 Maintenance

- 8.7.23 The operational phase of the Proposed Development will generate emissions from maintenance vehicle trips. It is estimated that there will be 2 trips per month during the 40-year operational period. It is assumed that these trips are undertaken by a petrol powered and medium sized car (DESNZ, 2025), over a maximum distance of 30 km (RICS, 2017). This is estimated to emit 0.6 tCO₂e per annum, and 22 tCO₂e over the 40-year operation period.

B6 Operational Energy

- 8.7.24 The Proposed Development will provide a substantial source of renewable electricity. There will also be some required energy use for the operation of the surveillance and monitoring systems, as well as an office for the Operation and Maintenance room. It is assumed that the Proposed Development will require 225,000 kwh per year with a carbon factor of 0.20704 kg CO₂e per kWh. (DESNZ, 2025). Carbon emissions from operation per year is estimated to be 47 tCO₂e. Over the 40-year operational period of the Proposed Development, 1,864 tCO₂e is estimated to be emitted from operational energy.



B7 Water Use

- 8.7.25 During operational phase, water will be used for cleaning of the solar PV panels, landscape maintenance, wastewater and for supply of drinking water on Site. **Table 8.14** shows the total carbon emissions for water use over is estimated to be 0.004 tCO₂e per year and 0.17 tCO₂e over 40 years.

Table 8.14: Water Use Emissions

Water consumption (litres per year)	Carbon factor (kg CO ₂ e/million litres)	tCO ₂ e/year	Source
22,000	191.30	0.004	Department for Energy Security and Net Zero (2025) UK Government GHG Conversion Factors for Company Reporting.

Operational Emissions Summary

Table 8.15: Operational Emissions

Lifecycle Stage	tCO ₂ e
B1 Use	60
B2-B5 Maintenance	0.6
B6 Operational Energy	47
B7 Water Use	0.004
TOTAL STAGE B OPERATION (annual)	106
TOTAL STAGE B OPERATION (40-year operational period)	4,263

- 8.7.26 As shown in **Table 8.15** above, the operational phase is estimated to result in 4,263 tCO₂e of across a 40-year operational period. This value does not include the use of a renewable energy production method (solar) as an alternative to traditional fossil fuel production.

Significance of Effect

- 8.7.27 It is considered that the Proposed Development is fully consistent with existing and emerging policy requirements (as outlined in **Appendix D.1**) and good practice standards for renewable projects through the implementation of primary mitigation.
- 8.7.28 The Proposed Development plays a clear and positive role in the decarbonisation of the National Grid, which in turn is crucial for the decarbonisation of the wider UK economy. The delivery of the Proposed Development from 2029 also demonstrates that the Proposed Development supports decarbonisation well before the 2050 net zero target. The Proposed Development is therefore considered to go beyond existing and emerging net zero policy. The Proposed Development is anticipated to have residual emissions as a result of maintenance and other activities described above.
- 8.7.29 In the first years after energisation, the Proposed Development has the potential to indirectly avoid GHG emissions when considered against the future baseline of the carbon intensity of the National Grid. During the operational phase, the Proposed Development is considered to have a **Beneficial** and therefore **Significant** effect. Whilst it will continue to help avoid and reduce GHG emissions and support the transition to net zero through the generation of low carbon energy, there may be the potential for this to reduce over the longer term.



Net Lifecycle Emissions

8.7.30 The net GHG emissions of the Proposed Development during construction and operation have been contextualised against the Welsh Carbon Budgets, the indicative Power sector budget, local Tyndall Centre carbon budgets and the forecast for the National Grid's average carbon intensity.

8.7.31 **Table 8.16** below presents a summary of the net emissions associated with the Proposed Development, including the 24-month construction period and 40-year operational phase.

Table 8.16: Net Lifecycle GHG Emissions

Lifecycle Stage	tCO ₂ e
Construction	56,644
Operation (40 years)	4,263
Net GHG Emissions	60,907

8.7.32 When compared to the baseline agricultural land emissions of 1,940 tCO₂e for the same time period, the Proposed Development is anticipated to increase emissions by 58,966tCO₂e.

8.7.33 The emissions associated with the Proposed Development have been contextualised against the Welsh Carbon Budget, the Welsh Carbon Budget for the Power Sector and Tyndall Centre Budgets for Denbighshire and Conwy in **Table 8.17, 8.18 and 8.19** respectively.

Table 8.17: Contextualisation of the Proposed Developments Emissions Against Welsh Carbon Budgets

Carbon budget Period	Total Welsh Carbon Budget (tCO ₂ e)	Project Contribution (tCO ₂ e)	Project contribution (%)
3 rd (2026-2030)	23,000,000	56,857	0.25%
4 th (2031-2035)	15,000,000	533	0.004%

Table 8.18: Contextualisation of the Proposed Developments Emissions against Power Residual Emissions

Carbon budget Period	Total Power Carbon Budget (tCO ₂ e)	Project Contribution (tCO ₂ e)	Project contribution (%)
4 th (2023-2027)	143,000,000	28,322	0.02%
5 th (2028-2032)	63,000,000	28,784	0.05%
6 th (2033-2037)	42,000,000	533	0.001%

Table 8.19: Contextualisation of the Proposed Developments Emissions against Denbighshire and Conwy Tyndall Centre Budgets

Carbon budget Period	Total Denbighshire Carbon Budget (tCO ₂ e)	Total Conwy Carbon Budget (tCO ₂ e)	Project Contribution (tCO ₂ e)	Project contribution (%)
4 th (2023-2027)	1,00,000	1,200,000	28,322	1.29%
5 th (2028-2032)	500,000	600,000	28,784	2.61%
6 th (2033-2037)	200,000	300,000	533	0.11%
7 th (2038-2042)	100,000	100,000	533	0.27%

8.7.34 Based on an export capacity of 110 MW and the net GHG emissions in **Table 8.17**, the Proposed Development is anticipated to have a carbon intensity factor of 0.002 kgCO₂e/kWh.



This demonstrates that the Proposed Development would have a lower carbon intensity value per kwh than that of the National Grid forecast for the first 20 years of operation. In total, the Proposed Development could save approximately 273,024 tCO₂e over the 40-year operational period when compared to the forecast for the carbon intensity of the National Grid. Therefore, the Proposed Development would emit less carbon than the future baseline without the Proposed Development. In this context, the Proposed Development can be considered to avoid future emissions through the generation of less carbon intensive energy.

- 8.7.35 Therefore, while the Proposed Development would not have carbon emissions that are below zero, it would indirectly avoid emissions compared to the without- Proposed Development baseline. As a result, there is potential for a **Beneficial** and **Significant** effect. The emissions avoided by the Proposed Development will reduce year on year as the National Grid will continue to decarbonise over the lifetime of the Proposed Development and so this beneficial effect could reduce over time. The carbon intensity of the grid from 2029 to 2069 will reduce from 0.049 kgCO₂e/kWh to 0.002 kgCO₂e/kWh. The Proposed Development would, however, be contributing to and enabling the decarbonisation forecast by providing a form of low carbon electricity generation infrastructure (i.e. solar and energy storage) both of which are key parts of the Government's strategy for decarbonisation of the energy sector. Solar projects such as this one would contribute to meeting the Government's targets of 45-47 GW of solar energy capacity by 2030 and the legally binding Net Zero target 2050, particularly when considering the anticipated electrification date of 2029, demonstrating that the Proposed Development can be deliver low carbon energy ahead of the 2050 trajectory to net zero.

8.8 Secondary Mitigation and Enhancement

Construction

- 8.8.1 No secondary mitigation measures are proposed.

Operation

- 8.8.2 No significant adverse operational effects are anticipated, and no secondary mitigation measures have been identified.

Decommissioning

- 8.8.3 It would not be appropriate to outline specific decommissioning requirements now as the decommissioning environment following the 40-year operational period is uncertain. However, policy is likely to be considerably different to today and is expected consider the use of alternatives to fossil fuels, utilising whatever forms of low-carbon technology and transportation that are available in 2069.

8.9 Residual Effects

Construction

- 8.9.1 The implementation of the CEMP will help to manage and control the use of fuel and electricity on Site, and therefore reduce GHG emissions associated with construction vehicles, plant and equipment. Construction waste will be managed through the CEMP, with a preference of prevention, reuse, recycling and recovery before disposal to landfill.
- 8.9.2 It is considered that the Proposed Development meets the applicable adopted policies during construction. The emissions generated from construction will be partially mitigated through the implementation of the CEMP but only through 'business as usual' measures that are not fully in line with the Welsh net zero trajectory. However, the construction phase of the Proposed Development is not carbon intensive, therefore it is considered that the Proposed Development will have a **Moderate Adverse** and **Significant** effect.



Operation

- 8.9.3 The assessment identified a negligible effect resulting from GHG emissions during the operation stage as emissions associated with maintenance activities, water usage and energy are not carbon intensive. During operation, the Proposed Development will generate electricity from solar irradiation and export this to the National Grid. Renewable energy generation from the Proposed Development will be approximately 110 MW. Solar power generation is less carbon intensive than other sources of energy per kWh, particularly in comparison to fossil fuel generation. The Proposed Development aids in reducing the National Grid average emissions, thus making the Proposed Development in line with the Welsh Government's net zero trajectory. Therefore, while the Proposed Development would not have carbon emissions that are below zero, it would indirectly avoid emissions compared to the no Proposed Development baseline of the average carbon intensity of the National Grid. As a result, the Proposed Development is expected to have a **Beneficial** and **Significant** effect with regards to climate change. The emissions avoided by the Proposed Development may reduce year on year as the National Grid will continue to decarbonise over the lifetime of the Proposed Development and this this beneficial effect could reduce over time.

8.10 Cumulative Effects

- 8.10.1 ISEP guidance (ISEP, 2022) identifies that all global cumulative GHG sources are relevant to the effect on climate change. This is taken into account in defining the receptor as being of high sensitivity to further emissions. For this reason, the guidance recommends that effects of GHG emissions from specific cumulative projects should not be individually assessed, as there is no basis for selecting particular cumulative projects that have GHG emissions over others. By its nature, the contextualisation of GHG emissions to the national carbon budgets incorporates cumulative contributions of other GHG sources which make up that context. Therefore, a separate cumulative assessment has not been undertaken for the GHG assessment.

PART 2: CLIMATE CHANGE RISK ASSESSMENT

8.11 Policy Context, Legislation, Guidance and Standards

National Legislation and Policy

- 8.11.1 The following legislation and policy documents have informed the assessment of effects within this section. Further details are provided in **Appendix D.1**.
- **Climate Change Legislation**, including Climate Change Act (2008) (2050 Target Amendment) Order 2019, Wellbeing of Future Generation (Wales) Act (2015).
 - **National Planning Policy**, including Town and Country Planning (Environmental Impact Assessment) Regulations (Wales) (2017) (as amended), Future Wales Plan 2040 (2021), Planning Policy Wales (2024), Climate Adaptation Strategy for Wales (2024).
 - **National Guidance**, including the Third National Adaptation Programme (NAP3) (Defra, 2023), UK Climate Change Risk Assessment 2022 (Defra, 2022) and the Climate Change Committee's (CCC), Climate Change Risk Assessment 2021 (CCRA3) (CCC, 2021).

Local Policy

- 8.11.2 Relevant Local Plans and policies are outlined below, with further details provided in **Appendix D.1**.
- DCC Local Development Plan 2006-2021 (Adopted June 2013);
 - CCBC Local Development Plan 2007-2022 (Adopted October 2013).



Technical Guidance

8.11.3 Several standards and guidance documents have been used to inform the GHG emissions assessment methodology and potential mitigation measures. Full details are provided in **Appendix D.1**:

- EIA Guidance on Climate Change Resilience and Adaptation (ISEP, 2020)⁸⁴.
- UK Climate Change Projections 2018 (UKCP18) Guidance: How to use the UKCP18 Land Projections (Met Office, 2018)⁸⁵.

8.12 Consultation

8.12.1 No further consultation has been undertaken beyond EIA Scoping.

8.12.2 At EIA Scoping, there were no specific comments on the scope and methodology of the assessment. The following was stated that “*the ES should contain information on impact of the project on climate and the vulnerability of the project to climate change*”. Part 2 of this chapter addresses the latter.

8.13 Methodology

Study Area

8.13.1 The CCRA uses the UKCP18 data provided by the UK Met Office (Met Office, 2018) for the 25 km grid cell within which the Site is located, although the area of influence for potential climate vulnerability impacts is expected to be limited to the Site and the immediate area around this.

Baseline Data Collection

8.13.2 The following data sources were reviewed to establish baseline conditions:

- Met Office historic climate data (Met office, N.Da) – to identify the historic trends of relevant climatic factors for the geographic area of the Proposed Development.
- UKCP18 (Met Office, 2018) – to identify the climate projections for the geographic area and appropriate temporal scope of the Proposed Development.
- A literature review of relevant publications which are referenced where relevant within Part 2 of this chapter, for variables for which UKCP18 does not provide information (for example, wind direction).

8.13.3 In addition, a review was undertaken of the following chapters within the ES and additional assessments which directly feed into the CCRA:

- Chapter 6: Flood Risk and Water Resource;
- Chapter 10: Biodiversity; and
- Chapter 11: Landscape and Visual.

⁸⁴ Institute of Sustainability and Environmental Professionals (ISEP) (2020). Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation

⁸⁵ Met Office (2018) UKCP18 Guidance: How to use the UKCP18 land projections. [Online] Available here: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---how-to-use-the-land-projections.pdf>



UKCP18

- 8.13.4 The UKCP18 produced by the UK Met Office (Met Office, 2018) is the main source of information on the future baselines.
- 8.13.5 UKCP18 uses observations of weather and climate combined with climate models to create a range of climate projections for different emissions scenarios. UKCP18 builds upon previous projections to provide information on how the climate of the UK may change over the rest of this century, describing how climatic conditions, long term seasonal averages and extreme weather conditions may change over future decades. The baseline data is complemented a literature review of relevant publications.
- 8.13.6 UKCP18 uses Representative Concentration Pathways (RCPs) to develop projections and consider factors such as economic activity, population growth and land use change, which will result in a different range of global mean temperature increases until 2099. RCP8.5 is the most conservative, highest-impact scenario. The scenario reflects an average increase in global mean surface temperature compared to the pre-industrial period of 4.3°C by 2081-2099. ISEP guidance (2020) generally recommends that the high emission scenario, RCP8.5, is used for climate change risk assessments. This is also considered the most appropriate scenario for assessing the impact of climate change on the Proposed Development based on policy and legislation for the UK to achieve net zero carbon by 2050, which is in line with limiting global temperature increases to 1.5°C, and professional judgement.
- 8.13.7 ISEP guidance recommends that the climatic baseline should consider extremes in short-term weather events, such as heatwaves; long-term climatic variability, such as seasonal changes in precipitation; and average climate norms, such as ambient temperature.
- A review of the following data from this projection has been undertaken:
 - Average Summer Precipitation (% change);
 - Average Winter Precipitation (% change);
 - Average Annual Precipitation (% change);
 - Maximum Average Summer Temperature;
 - Minimum Average Winter Temperature;
 - Annual Mean Temperature;
 - Total Cloud Anomaly (%); and
 - Time-mean Sea Level Anomaly (m).
- 8.13.8 The projections (**Appendix D.2**) show the potential change in temperature and precipitation above or below the observed temperature and precipitation for 1981-2000.

Assessment

- 8.13.9 In accordance with ISEP guidance, the vulnerability and resilience of the Proposed Development to climate change has been identified by undertaking a risk assessment that includes:
- “Identifying potential climate change risks to a Proposed Development or project;
 - Assessing these risks (potentially prioritising to identify the most severe); and
 - “Formulating mitigation actions to reduce the impact of the identified risks.” (ISEP, 2020)



8.13.10 The risk assessment considers the likelihood of a hazard occurring that could result in an impact on sensitive receptors. In addition, the magnitude of effects on the Proposed Development will depend on the severity of the consequence of the impact, and the vulnerability of the receptor itself. The definitions of these terms can therefore be summarised as follows (ISEP, 2020):

8.13.11 **Hazard** is an effect of climate change which has the potential to cause an impact on sensitive receptors associated with the Proposed Development;

- **Magnitude** is the likelihood of impact occurring and the consequence of the impact of a hazard; and
- **Vulnerability** is the degree to which receptors are susceptible to adverse impacts and is influenced by sensitivity, adaptive capacity, and exposure to climate hazards.

Sensitive Receptors

8.13.12 Receptors that may be affected by climate change have been identified with consideration of both extreme weather events and gradual climatic changes in the study area for the Proposed Development. In accordance with ISEP guidance, the sensitivity of receptors to climate change effects during operation is described in **Table 8.20**. In ascribing the sensitivity of receptors in relation to potential climate change effects, the susceptibility of the receptor (e.g. ability to be affected by a change) and the vulnerability of the receptor (e.g. potential exposure to a change) must be taken into account. These are defined in ISEP (2020) guidance as follows:

“The susceptibility of the receptor can be determined using the following scale:

- **High susceptibility** = receptor has no ability to withstand/not be substantially altered by the projected changes to the existing/prevaling climatic factors (e.g. lose much of its original function and form).
- **Moderate susceptibility** = receptor has some limited ability to withstand/not be altered by the projected changes to the existing/prevaling climatic conditions (e.g. retain elements of its original function and form).
- **Low susceptibility** = receptor has the ability to withstand/not be altered much by the projected changes to the existing/prevaling climatic factors (e.g. retain much of its original function and form).

8.13.13 The vulnerability of a receptor can be defined using the following scale:

- **High vulnerability** = receptor is directly dependent on existing/prevaling climatic factors and reliant on these specific existing climate conditions continuing in future (e.g. river flows and groundwater level) or only able to tolerate a very limited variation in climate conditions.
- **Moderate vulnerability** = receptor is dependent on some climatic factors but able to tolerate a range of conditions (e.g. a species which has a wide geographic range across the entire UK but is not found in southern Spain).
- **Low vulnerability** = climatic factors have little influence on the receptors.”

Table 8.20: Receptor Sensitivity

Receptor	Sensitivity	Reasoning
Construction		



Receptor	Sensitivity	Reasoning
Construction workers	Moderate to high	Construction workers supporting the construction of the Proposed Development will be susceptible to climate change, depending on a range of factors such as age and existing poor health.
The Natural Environment (Ecology, Landscaping and Planting)	Moderate	The existing habitats on Site are not considered to be of high vulnerability to the broad effects of climate change however their vulnerability could be impacted through the construction of the Proposed Development.
Operation		
Future users of the Site (e.g. workers)	Moderate to High	Some future users of the Site (e.g. maintenance staff) will be more susceptible to climate change than others, depending on a range of factors such as age and existing poor health.
Infrastructure including panels, cables and BESS	Moderate	Infrastructure may require more maintenance and repair as changes to climatic norms cause increased stress on for example, below-ground cables. The sensitivity is classified as moderate as efficiently working infrastructure is fundamental to the operation of the Proposed Development.
The Natural Environment (Ecology, Landscaping and Planting)	Moderate	The proposed habitats on Site include hedgerow, trees, and wildflower grassland. These habitats are not considered to be of high vulnerability to the broad effects of climate change such as changes in average temperatures or changes to the hydrology.

Determining Significance

- 8.13.14 There is an absence of significance criteria for determining the significance of effects resulting from climate change. ISEP guidance states that receptor vulnerability and uncertainties must be considered. Significance has therefore been determined by ISEP guidance and professional judgement.
- 8.13.15 Effects that are described as 'minor' or 'negligible' are determined to be 'Not Significant' and effects that are described as 'moderate', 'major' or 'substantial' are determined to be 'Significant'.

Limitations and Assumptions

- 8.13.16 Scientific evidence shows that our climate is changing. However, there are significant uncertainties in the magnitude, frequency and spatial occurrence within the climate projections utilised in this assessment. The UKCP18 are not predictions or forecasts but simulations of potential scenarios of future climate under a range of hypothetical emissions scenarios and assumptions, and therefore cannot be treated as exact or factual, but projection options. The projections are dependent on future global GHG emissions and, while several different scenarios are provided, it cannot be reliably predicted which (if any) emission scenario will occur over the next 80 years (Fung et al., 2018).
- 8.13.17 The UKCP18 projections used for this assessment considered the nearest available 25 km grid by distance to the Site, as specific coverage for the Site is unavailable. It is presumed that the climatic conditions are similar and that any difference would be negligible.
- 8.13.18 Additionally, projections after the 2040s increasingly diverge between scenarios and provide greater confidence for long-term climate averages than extreme events. For example, there is greater confidence around changes in temperature than there is in relation to wind. Levels of confidence and certainty are considered when assessing the likelihood and consequence of climate hazards.



8.13.19 This Chapter reports the climate change risk assessment which has used the latest information sources available at the time of submission. New climate information is published regularly as more in-depth analysis of climate changes is completed, which may supersede the information used to inform this assessment.

8.13.20 There is often uncertainty in the relationship between changes in climate hazards and the respective response in terms of Proposed Development performance. This uncertainty has been assessed qualitatively.

8.13.21 The assessment assumes that mitigation will be effectively implemented.

8.14 Baseline Conditions

UK Observations

8.14.1 Observed climate changes over the UK include:

- The most recent decade (2014-2023) has been on average 0.42°C warmer than the 1991-2020 average and 1.25°C warmer than 1961-1990 (Kendon et al., 2024).
- Six years in the most recent decade (2014-2024) have been within the top ten warmest in the UK series from 1884, with all 10 warmest years occurring in the 21st century (Kendon et al., 2024).
- A new highest daily minimum temperature record was recorded during the July 2022 heatwave of 26.8°C (Met Office, 2022).
- A new highest daily maximum temperature was recorded during the July 2022 heatwave, with a temperature of 40.3°C (Met Office, 2022).
- Provisional data shows that the summer of 2025 was the warmest summer on record for the UK, with a mean temperature of 16.10°C, surpassing the previous record of 15.76°C set in 2018. This included four heatwaves⁸⁶.
- In the past few decades there has been an increase in annual average rainfall over the UK. However, natural variations are also seen in the longer observational record (Lowe et al., 2019).
- The most recent decade (2014-2023) has been on average 9% wetter than 1991-2020 and 24% wetter than 1961-1990 for the UK overall (Kendon et al., 2024).
- Spring of 2025 was the warmest on UK record and the driest spring in more than 100 years making it the sixth driest spring since records began⁸⁷
- There have been fewer occurrences of max gust speeds exceeding 40/50/60 Kt for the latest two decades compared to the 1980s and 1990s. The UK annual mean wind speed from 1969 to 2023 shows a downtrend, consistent with global observations (Kendon et al., 2024).

8.14.2 Widespread and substantial snow events have occurred in 2021, 2018, 2013, 2010 and 2009, but their number and severity have generally declined since the 1960s (Pirret et al., 2021).

⁸⁶ Met Office (2025) Summer 2025 is the warmest on record for the UK . [Online] Available here: <https://www.metoffice.gov.uk/about-us/news-and-media/media-centre/weather-and-climate-news/2025/summer-2025-is-the-warmest-on-record-for-the-uk>

⁸⁷ Met Office (2025) Double record breaker: Spring 2025 is warmest and sunniest on UK record. [Online] Available here: <https://www.metoffice.gov.uk/about-us/news-and-media/media-centre/weather-and-climate-news/2025/double-record-breaker-spring-2025-is-warmest-and-sunniest-on-uk-record>



Regional Observations

8.14.3 Historical climate averages during the period 1991 – 2020 for the closest climate station to the Site (Rhyl No.2), obtained from the Met Office website (Met Office, undated), indicate the following:

- Average annual maximum temperature was 13.64°C;
- Warmest month on average was July (mean maximum temperatures of 19.84°C);
- Coldest month on average was February (mean minimum temperature of 2.85°C);
- Average total annual rainfall was 828.45 mm;
- Wettest month on average was December (average monthly rainfall of 96.60 mm); and
- Driest month on average was March (average monthly rainfall of 49.06 mm)

Local Observations

- 8.14.4 The Site lies with an area issued with a red warning for extreme heat on the 15th July 2022. The unprecedented heatwave marked a milestone in UK climate history as the first year that 40°C was recorded within the UK.
- 8.14.5 Denbighshire and Conwy are vulnerable to storms; weather warnings for rain, thunderstorms, snow, ice, and wind are common (Met Office, 2025).
- 8.14.6 The majority of the Site has been identified by Natural Resources Wales (NRW) as being at risk from flooding and is situated within Flood Zones 2 and 3 Rivers and Sea (a combined 0.1% - 1% risk of flooding from rivers and sea including climate change). The section of cable routing that makes up part of the Proposed Development is located within Flood Zone 2 and 3 Surface Water and Small Watercourses (areas with 0.1% to > 1% chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change).
- 8.14.7 A number of historic flood events have been recorded for most of the Site.
- 8.14.8 Areas of the Solar Site (excluding the Cable Corridor and BESS storage) are situated within the TAN15 Defended Zone. This is an area that benefits from Risk Management Authority flood defences which consider a minimum Standard of Protection for River and Sea flood risk (NRW, 2025). For flood defences built from 2016 onwards, there must be an allowance for climate change.
- 8.14.9 Sea level rise was modelled for potential impacts on the Proposed Development in **Chapter 6 – Flood Risk and Water Resources**. Flood modelling has been undertaken to simulate the impact of a breach in the local defences coinciding with a significant flood event, inclusive of the impacts of sea level rise and climate change. This is very unlikely to occur but if did happen at the end of the Proposed Development lifetime (i.e. operational year 40), flooding would be in the region of 1m deep across the Solar Site.

8.15 Future Baseline

- 8.15.1 This section presents the future climate simulations extracted from UKCP18 up to 2075. Figures 1.1 – 1.6 in **Appendix D.2** show the grid square projections for average summer, winter and annual precipitation, maximum average summer temperature, minimum average winter temperature and annual mean temperature. A summary of the projections is provided below. This is supported by data extracted from the probabilistic projections which is also presented in **Appendix D.2**, a summary of which is provided in **Table 8.21**. below.



Table 8.21: 50th Percentile Climate Projections at 25 km grid square 312500, 362500, using baseline 1981-2000 scenario RCP 8.5

Climate Variable at 50th Percentile								
Year	Mean air temperature anomaly at 1.5 m (°C)	Annual Precipitation rate anomaly (%)	Maximum Summer air temperature anomaly at 1.5 m (°C)	Average Summer Precipitation rate anomaly (%)	Minimum Winter air temperature anomaly at 1.5 m (°C)	Average Winter Precipitation rate anomaly (%)	Total Cloud Anomaly (%)	Time-mean Sea Level Anomaly (m)
2025	0.81	0.45	1.02	-6.36	0.74	0.25	-0.52	0.10
2027	0.86	0.37	1.07	-6.82	0.79	0.26	-0.59	0.11
2029	0.91	0.27	1.13	-7.29	0.84	0.27	-0.65	0.12
2050	1.59	-1.61	2.05	-16.90	1.56	2.67	-1.71	0.25
2075	2.83	-2.94	3.92	-29.91	2.57	5.93	-3.74	0.44

**Anomaly refers to the change compared to the baseline. The projections are not absolute values.*

- 8.15.2 The projections show a continuous increase in annual average temperature over the next 50 years. Annual precipitation is shown to vary year on year, with some years being dryer or wetter than previous years.
- 8.15.3 The projections suggest that summers will become warmer and drier, with an expected increase in maximum summer temperatures and overall decline in summer precipitation. Natural variations may mean that some cooler and/or wet summers will occur.
- 8.15.4 Winters may become milder and wetter, with an overall increase in both minimum winter temperature and winter precipitation. Natural variations may mean that some cold and/or dry winters may still occur.
- 8.15.5 In the UK, the heaviest snowfalls tend to occur when the air temperature is between zero and 2°C (Met Office, N.D). There is less certainty in the magnitude of change to snow occurrence and amount, although climate models do show a downward trend in both falling and lying snow over time.

8.16 Extreme Weather Events

Heatwaves

- 8.16.1 A heatwave is an extended period of hot weather relative to the expected conditions of the area at that time of year, which may be accompanied by high humidity. For the UK, the Met Office defines a heatwave as “*when a location records a period of at least three consecutive days with daily maximum temperatures meeting or exceeding the heatwave temperature threshold*” (Met Office, undated). The threshold varies by county, which for the Site is 25°C. As outlined in **Table 8.21** above, maximum summer air temperatures are projected to increase by 5.5°C by 2099, which could result in the heatwave threshold being met more frequently.
- 8.16.2 Research has found that the likelihood of heatwave events in the UK is about 10 times higher due to climate change (Vautard et al., 2022). This is reinforced by Kay et al., 2025 who’s study suggests that the likelihood of temperatures in the UK reaching 40°C has been increased from a 0.2% chance in the 1960s to a 4.2% chance in 2023. Expected increases in the maximum summer air temperature and annual average air temperature over the next 50 years could result in more intense and more frequent heatwaves.



Sensitive receptors which may be affected by heatwaves include:

- **Future Users of the Site:** the well-being of construction and maintenance staff will be directly affected by heatwaves. Any additional cooling methods would increase the energy demand of the Proposed Development.
- **Infrastructure:** heat waves will impact the operational capacity of energy infrastructure. Higher temperatures may influence the efficiency of the panels.
- **Ecology:** higher temperatures will affect the ability of vegetation to establish and can cause effects to habitats and species health.

Low Rainfall and Drought

- 8.16.3 Droughts are natural events which occur when a period of low rainfall creates a shortage of water. The UKCP18 projections show a trend toward drier summers on average, although the uncertainties of these are wide ranging. Research on the influence of climate change on drought in the UK is limited and given the several different factors that influence droughts (meteorological, hydrological, and societal), it is challenging to identify whether drought events will become more common and prolonged in the future.
- 8.16.4 The last drought recorded by North Wales, the area where the Proposed Development is located, was in 2022 when a prolonged period of dry weather resulted NRW declaring 'drought' status for the first time since 2006 (NRW, 2022). South West Wales alerted a prolonged dry weather in July 2025⁸⁸, after low rainfall in July resulted in reduced river flows and soil moisture levels.
- 8.16.5 Prolonged periods of low rainfall can influence the stability of soil types, making them more susceptible to subsidence. Soil types including clay, silt and gravel soils are known to be at risk. Clay and silt are 'cohesive' soils, which means that volumes will vary depending on their moisture content i.e. swelling when wet and shrinking when dry. As the UK climate warms, these soils will be more at risk of shrinkage.
- 8.16.6 Sensitive receptors which may be affected by low rainfall and drought include:
- **Infrastructure:** if cooling systems within the BESS infrastructure, or safety management plans are reliant on water supply, a prolonged drought could impact services and may prevent operations. Moreover, ground movement/subsidence based on soil types may have an impact on the foundations of infrastructure or underground cables causing physical damage .

Extreme Cold Snaps

- 8.16.7 The number of icing days (when the daily maximum temperature stays below 0 °C) has been decreasing since the 1960s. These long-term trends point to a long-term warming trend of the UK's climate and a reduction in cold events (Kendon et al, 2021).
- 8.16.8 It is projected that winters may become increasingly milder, with minimum temperatures set to rise by over 3.3°C by 2099. Natural variations may mean that some cold and/or dry winters may still occur. The impact of extreme cold snaps on the Proposed Development has not been assessed further due to the reduced likelihood of this impacting the Proposed Development due to the nature of the renewable energy project.

⁸⁸ Natural Resources Wales (2025). South West Wales returns to 'prolonged dry weather' status. [Online] Available here: <https://naturalresourceswales.gov.uk/about-us/news-and-blogs/blogs/dry-weather-updates-2025/?lang=en#:~:text=Our%20drought%20teams%20have%20met%20this%20week%20to,minimal%20response%20to%20rainfall%20and%20levels%20quickly%20regressing.>



Heavier Rainfall

- 8.16.9 Heavy rainfall that may lead to flooding is hard to predict in the long term. A study has shown that an extended period of extreme winter rainfall in the UK is now about seven times more likely due to human-induced climate change (Christidis and Stott, 2015), although the largest changes in heavy rainfall since 1961 have occurred in Scotland and northern England.
- 8.16.10 While projections indicate a trend that summers will become dryer toward the end of the century, there is also evidence that summer rainfall events may become more intense when they do occur. The climate projections for the Site show there will be an increase in average winter precipitation.

Sensitive receptors which may be affected by flooding from heavier rainfall include:

- **Infrastructure:** flooding could cause restricted access to the Site, therefore limiting access to solar infrastructure and the BESS substation. Potential damage to infrastructure from flooding events.
- **Ecology:** flooding could destroy/disturb habitats and displace or kill species.

High Winds and Storms

- 8.16.11 On average throughout the year, near-surface wind speeds are projected to decrease. However, during the winter season, where more significant impacts of winds are experienced (Met Office, 2019), near-surface winds speeds are projected to rise towards the second half of the 21st Century.
- 8.16.12 These projections are modest compared to natural variability from month to month and season to season. Research and climate projections indicate that as the regional and global patterns are impacted by climate change, this will influence storm activities and wind. The change in sea surface temperatures, ice in regions close to poles, position and strength of global jet streams and climate patterns, such as El Nino, will influence the strength of storms. However, there is still uncertainty of how this influence will occur. In the UK, changes in the climate will cause winter windstorms to increase significantly in number and intensity (Met Office, 2014)⁸⁹. Warming water in the North Atlantic and rising sea level rises are likely to worsen the impacts of storm surges in the UK (Met Office, 2014).
- 8.16.13 Storms and extreme weather events have a likelihood to increase in frequency or severity as a result of climate change, therefore likely significant effects resulting from storms and high winds were scoped in for further assessment.

Sensitive receptors which may be affected by storms and high winds include:

- **Infrastructure:** damage to infrastructure from extreme winds and storms, limiting production of solar infrastructure.
- **Ecology:** storms and extreme winds destroying or disturbing habitats and species.

Sea Level Rise

- 8.16.14 Sea level rise is the increase in coastal water levels due to the melting of global land-based ice (UKCP18, 2023).⁹⁰ This increase in sea level will change coastal land and increase flood

⁸⁹ Met Office (2014). UK and Global extreme events – Wind storms. [Online] Available here: <https://www.metoffice.gov.uk/research/climate/understanding-climate/uk-and-global-extreme-events-wind-storms#:~:text=In%20future%2C%20most%20climate%20projections,projected%20to%20cross%20the%20UK.>

⁹⁰ UKCP18 (2023). UKCP18 Factsheet: Sea-level rise and storm surge- supplementary data. [Online] Available here: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_factsheet_sea_level_rise_storm_surge_supp_data_mar23.pdf



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risk. Sea level rise depends on the location around the UK and will increase with higher emissions scenarios.

8.16.15 As the Proposed Development is located within proximity to coastal region, likely significant effects resulting from sea level rise were scoped in for further assessment.

Sensitive receptors which may be affected by sea level rise include:

- **Infrastructure:** flooding causing restricted access to the Site and damaging the BESS and solar.
- **Ecology:** sea level rise destroying or disturbing habitats and species.

Summary of Projected Climate Change Extreme Weather Events

8.16.16 In summary, it is anticipated that the Proposed Development will experience the following climatic changes:

- An increase in average annual temperature;
- An increase in maximum temperature, particularly in the summer;
- More extreme rainfall events;
- An increase in winter rainfall
- A reduction in summer rainfall;
- High winds; and
- Sea level rise.

8.16.17 The projected climatic changes outlined above may have a direct impact on the Proposed Development or result in secondary impacts which may impact the performance or integrity of the Proposed Development i.e. a 'climate hazard'. As a result of the projected climatic changes, there is an increased risk of:

- Long term changes to climate norms;
- Heatwaves;
- Low rainfall and drought;
- Heavy rainfall and flooding; and
- Increase in storm intensity.

8.17 Primary and Tertiary Mitigation

8.17.1 The Proposed Development has been designed to incorporate mitigation and adaptation measures to address climate change. This section provides a summary of these measures below, many of which have been addressed in full in other discipline chapters within this ES.

Primary Mitigation

Construction

Flood Risk



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- 8.17.2 Climate change is likely to increase pressure on water sources and the frequency and severity of flooding. Construction compounds and stockpiling of materials (if required) will be located outside areas at risk of flooding to reduce the risk of flooding and pollutants entering floodwater.

Ecology and Planting

- 8.17.3 Habitats and species provide resilience to climate impacts by sequestering carbon dioxide, providing shading and improving air quality. The position of work compounds and storage areas, construction hours and use of artificial lighting will be carefully chosen to reduce impacts, secured via the CEMP.

Operation

Flood Risk

- 8.17.4 The Proposed Development will be designed to be resilient to management of storm water and extreme rainfall events. Sustainable Drainage System (SuDS) will be incorporated in the Proposed Development to reduce flood risk and control the quality and quantity of surface water runoff conveyed to the local watercourses.
- 8.17.5 As set out in **Chapter 6 – Flood Risk and Water Resources**, there are a number of measures embedded within the design to mitigate flooding. For example, the tracker solar panels can stow at a sufficient height such that there is no risk of damage to the water sensitive parts. Containerised infrastructure in the Solar Site would be located in areas of shallowest extreme flooding, where possible. They would also be raised to further reduce the chance of them flooding.

Ecology and Planting

- 8.17.6 Planting provides resilience in several ways, including sequestering carbon dioxide, providing shade and improving air quality. An ecological mitigation and enhancement area of approximately 10 ha will be provided as part of the Proposed Development. By providing this level of planting and biodiversity, the Proposed Development will be more resilient to changes in the climate.

Infrastructure, Design and Land Stability

- 8.17.7 The BESS will be equipped with HVAC for cooling to protect the infrastructure from degradation caused by overheating.
- 8.17.8 Solar panels can be protected from extreme wind events through design mechanisms such as wind-resistant mounting systems and choosing specific angles and orientations to reduce potential impacts. Landscaping on Site will additionally reduce the impacts of high wind events on the infrastructure.

Tertiary Mitigation

Construction

- 8.17.9 An oCEMP (**Appendix A.5**) will be submitted with the planning application which manages any construction effects on the Environment. In accordance with the oCEMP and outline Ecological Construction Method Statement (oECMS) (**Appendix F.3**), mitigation measures will be taken to reduce any impacts on habitats and species. Potential flood risk and drainage effects of the construction stage of the Proposed Development are also considered as part of the CEMP. The CEMP will additionally consider health and safety measures to protect workers during events of flooding and climate extremes.



- 8.17.10 As the climate changes, work practices will be managed during construction to be better adapted to weather conditions, including using Personal Protection Equipment (PPE) more frequently. Work practices will be adapted for events such as increased flooding, storms, high wind events and heatwaves. Health and safety of the construction workers for the Proposed Development are considered in the CEMP.

Operation

- 8.17.11 An oLEMP will be submitted of the planning application. The LEMP will include consideration of the maintenance / management measures associated with onsite ecological networks and features that are to be retained, enhanced and created within the Proposed Development. This would increase the long-term resilience of habitats and species within the Site and managing areas that may be affected by droughts. Selected species for the proposed planting within the Site should include those tolerant to higher temperatures, drought resistant and need less irrigation. This will increase resilience and reduce pressure on water supply during a drought.
- 8.17.12 As set out in Chapter 6- Flood Resources and Water Environment, a Drainage Strategy will be submitted with the planning application to ensure the Proposed Development does not increase flood risk.
- 8.17.13 As above, to protect workers during operation, PPE will be utilised more frequently, and work practices will be adapted through mechanisms such as timing maintenance around storms.

8.18 Assessment of Likely Significant Effects

Construction

- 8.18.1 There is anticipated to be an increase of average annual temperature and decrease in average annual precipitation over the construction period (2027-2029). Climate hazards have the potential to disrupt or delay the construction programme and affect suitable working hours due to unsafe conditions for workers and potential damage to equipment or works. The risk of climate hazards, for example from heatwaves or periods of heavy precipitation may increase during the construction period however it is expected that these will be managed through standard construction and health and safety practices outlined in the CEMP, such as securing material/equipment and not undertaking works during periods of extreme rainfall. The effect of climate change on the Proposed Development during the construction phase is therefore likely to be **Negligible**. The impact of climate change on the Proposed Development during construction is therefore considered to be **Not Significant**.

Operation

- 8.18.2 **Table 8.22** outlines the potential significant effects from climate on identified receptors within the Development.



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Table 8.22: Climate Change Risk Assessment

Climate Hazard	Receptor	Receptor Sensitivity	Potential Impact (with Primary and Tertiary Mitigation)	Significance
Long term changes to climate norms	Future users of the Site (e.g. workers)	Moderate to High	Future site users, such as workers, are categorised as a highly sensitive receptor as workers are susceptible to climate extremes. Therefore, their health & safety must be managed. The climate is expected to become drier and hotter in summers and wetter and milder in winters in the area where the Proposed Development is located. Workers may therefore be at more risk during periods of climatic extremes, such as working in high temperatures. This can be mitigated through thermal shading from the various planting and landscaping as part of the Proposed Development. As the climate changes, work practices will be managed during operations to be better adapted to weather conditions, including using PPE more frequently.	Negligible
	Infrastructure, including panels, cables and BESS	Moderate to High	Long term changes to climate norms have the potential to degrade infrastructure of the Proposed Development through events such as extreme temperatures, wind or flooding. Infrastructure may require more maintenance and repair as changes to climatic norms cause increased stress on, for example, below-ground cables. Risk will be managed from future climate change in accordance with nationally accepted standards and guidance.	Negligible
	Ecology, landscaping and planting	Moderate to High	Warmer, drier summers and milder wetter winters are likely to have a long-term impact on species' ranges, potentially causing flora and fauna to relocate to more tolerable climate conditions. The changes in annual and seasonal averages from climate change may also impact the timing of seasonal biological activities, such as migrating birds. However, none of the existing species on Site or proposed habitats are considered particularly sensitive to long-term changes in climate norms.	Minor Adverse



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Climate Hazard	Receptor	Receptor Sensitivity	Potential Impact (with Primary and Tertiary Mitigation)	Significance
Heatwaves	Future users of the Site	Moderate to High	Increased frequency and intensity of heatwaves may adversely impact human health by increasing the risk of mortality and morbidity due to heat stress, stroke and exhaustion (NHS, 2018) ⁹¹ . To manage the increase of heatwaves, work practices will be adapted to decrease extreme events, such as through hydration stations or increased shading on the Site.	Minor Adverse
	Infrastructure, including panels, cables and BESS	Moderate	Infrastructure may require more maintenance and repair as changes to the climate increase extreme weather events creating stress on infrastructure, for example overheating, on solar arrays and Grid Connection Infrastructure. The BESS will incorporate temperature control for safety and efficiency reasons during climate extremes.	Minor Adverse
	Ecology, landscaping and planting	Moderate	Increased frequency of extreme weather events such as heatwaves could change and damage vegetation without the implementation of further mitigation. The LEMP will be implemented to introduce practices which manage and protect planting on Site.	Minor Adverse
Low rainfall and drought	Future users of the Site	Moderate to High	Period of low rainfall and drought have the potential to adversely affect public water supply. However, the Proposed Development will be utilising minimum water for future maintenance workers. Additionally, water companies have a statutory duty to maintain a secure water supply during a drought.	Negligible
	Infrastructure, including panels, cables and BESS	Moderate	Reduction in rainfall could cause soil moisture deficits, which may affect soil stability. Soil conditions and ground water level will be considered for the foundations of the solar panels and the BESS. It is considered that design guidance already allows for these fluctuations in groundwater levels, thus not increasing the likelihood of damage to the infrastructure. Periods of low rainfall and drought may increase the formation and suppression of dust in the air as ground on the Site dries out. Dust	Negligible

⁹¹ Public Health England (2019). Heatwave plan for England. [Online] Available here: https://www.transformationpartners.nhs.uk/wp-content/uploads/2019/06/Heatwave_plan_for_England_2019.pdf



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Climate Hazard	Receptor	Receptor Sensitivity	Potential Impact (with Primary and Tertiary Mitigation)	Significance
			deposition on solar panels may adversely affect the generating capability of the Proposed Development. In regard to ground instability, Chapter 9- Ground Conditions and Contamination does not identify any potential significant effects with respect to low rainfall / drought conditions.	
	Ecology, landscaping and planting	Moderate	Increased frequency of low rainfall and droughts combined with higher average temperatures may adversely impact the productivity, function and structure of ecosystem services by, for example, causing an increase in erosion as soils and substrates dry out.	Negligible
Heavy rainfall and flooding, including sea level rise	Future users of the Site	Moderate to High	Flooding has the potential to isolate the Site, disrupt maintenance provision and increase risk to human health. However, working practices will be adapted to adjust for extreme weather events through mechanisms such as wearing PPE more frequently. Chapter 6- Flood Risk and Water Resources concludes there are no significant effects on flood risk (including that arising from sea level rise) that will result from the Proposed Development.	Negligible
	Infrastructure, including panels, cables and BESS	Moderate	Increased precipitation during the winter and more intense rainfall events are likely to increase flood risk and surface water run-off. This could prevent the use of and/or damage infrastructure and also adversely affect water quality. Chapter 6 assesses the likely significant effects of flood risk and states that there will be a Negligible effect, as the Proposed Development is located outside of flood extents and at a level above potential sources of flooding from both the sea and on land.	Negligible
	Ecology, landscaping and planting	Moderate	Flooding has the potential to damage planting and habitats on Site; however the proposed Drainage Strategy will be designed to accommodate all surface water flows and mimic as closely as practical the natural flow routes of the existing Site.	Negligible



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Climate Hazard	Receptor	Receptor Sensitivity	Potential Impact (with Primary and Tertiary Mitigation)	Significance
Extreme Storms and High Wind	Future users of the Site	Moderate	Future site users, such as workers, are categorised as a highly sensitive receptor as workers are susceptible to climate extremes. Therefore, their health & safety must be managed during extreme storms and high wind. As the climate changes, work practices will be managed during operations to be better adapted to weather conditions, including using PPE more frequently. Additionally, times of work can be avoided during these storms to reduce impacts to future maintenance users of the Site.	Negligible
	Infrastructure, including panels, cables and BESS	Moderate to High	Storms and wind have the potential to degrade infrastructure of the Proposed Development. Infrastructure may require more maintenance and repair as changes to storms and wind cause more stress on infrastructure such as solar panels. Risk will be managed from future climate change in accordance with nationally accepted standards and guidance. However, as storms and high wind become more frequent, design measures might be implemented to strengthen infrastructure against extreme events.	Minor Adverse
	Ecology, landscaping and planting	Moderate	Storms and high wind events have the potential to damage planting and habitats on Site. This may adversely impact the productivity, function and structure of ecosystem services, for example by eroding the habitats. However, the planting of the Proposed Development will be designed to have minimal sensitivity to these extreme events.	Negligible



In-Combination Effects

- 8.18.3 There is potential for in-combination climate change effects to exacerbate other environmental effects identified in other topic chapters without mitigation. There is a need to deliver a co-ordinated approach to the climate change mitigation measures to provide climate resilience within the Proposed Development. It is considered that, with the implementation of the primary mitigation measures identified in this Chapter and careful consideration of climate change mitigation and adaptation measures referred to in additional technical chapters of this ES, the effects identified within the topic chapters will not be exacerbated as a result of climate change. In-combination effects are therefore **Negligible** and **Not Significant**.

8.19 Residual Effects

- 8.19.1 Potential minor adverse effects to future users of the Site were identified resulting from heatwaves. Mitigating these effects beyond the further mitigation proposed is reliant on aspects outside of the scope of the Proposed Development, such as increasing the resilience of health services and global reduction of emissions. Therefore, the likely effect remains **Minor Adverse** and **Not Significant**.
- 8.19.2 Potential moderate adverse effects were identified for ecology, landscaping and planting resulting from droughts, heatwaves, flooding, storms and changes to climatic norms. This would be managed through the implementation of planting regime that considered climatic-changes and implementation of the LEMP. Climatic events which could have an adverse effect on the Site or construction workers will be managed through the CEMP. Design measures will also be utilised to protect the infrastructure from degradation or overheating. Following these further mitigation measures, the likely effect is therefore considered to be **Minor Adverse** and **Not Significant**.

8.20 Cumulative Effects

- 8.20.1 There are no cumulative or inter-project climate vulnerability and resilience effects between the Development and other approved developments in the surrounding area, as the identified potential impacts and mitigation measures are specific to the Proposed Development.

8.21 Summary

- 8.21.1 During the construction phase of the Proposed Development, effects will be **Not Significant** from climate change risks and hazards. This is due to the mitigation measures detailed in the CEMP, including health and safety precautions such as adapting work practices to take account of climate change effects. GHG emissions arising from the construction phase of the Proposed Development will be **Moderate Adverse** and **Significant**. The construction phase will be carbon intensive and is not reflective of net zero targets, however this is a temporary effect which will overall be balanced against the renewable generation of the Proposed Development.
- 8.21.2 During the operation phase of the Proposed Development, there will be a **Beneficial and Significant** effect arising from the renewable generation. This effect will reduce over time as the national grid decarbonises in line with national policy of clean power by 2030 and net zero by 2050. The effects of climate change on the Proposed Development will be **Not Significant** as mitigation measures such as design, LEMP and adaptable working practices will be applied to minimise impacts.
- 8.21.3 The summary of residual effects for the GHG Assessment and CCRA are shown in **Table 8.23**.



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Table 8.23: Summary of Significant Effects – Climate Change

Topic	Stage of Development	Residual Effects	Primary and Tertiary Additional Mitigation	Duration of Effect	Geographical Importance							Significance of Residual Effect
					I	U K	E	R	C	B	L	
Climate Change	Construction	GHG Emissions	CEMP and CTMP	Temporary	X							Moderate Adverse (Significant)
	Construction	Effects of climate change on construction workers	CEMP and managing work practices to be better adapted to weather conditions	Temporary							X	Negligible (Not Significant)
	Operation and Maintenance	GHG Emissions	Low carbon energy generation	Permanent	X							Beneficial (Significant) potentially reducing over the longer term
	Operation and Maintenance	Effects of climate change on infrastructure	Design measures	Permanent							X	Minor Adverse (Not Significant)
	Operation and Maintenance	Effects of climate change on future site users	Managing work practices to be better adapted to weather conditions	Permanent							X	Minor Adverse (Not Significant)
	Operation and Maintenance	Effects of climate change on the natural environment (Ecology, Landscape and Planting)	LEMP	Permanent							X	Minor Adverse (Not Significant)
	Operation and Maintenance	Effects of climate change on flood risk and sea level rise	Sustainable Drainage System	Permanent							X	Negligible (Not Significant)



9 Ground Conditions and Contaminated Land

9.1 Introduction

- 9.1.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development on the environment with respect to ground conditions and land contamination that has been undertaken. The Chapter identifies the potential beneficial and adverse impacts and significance of effects arising from the Proposed Development on human health and the environment during the construction, operational and maintenance and decommissioning phases. The assessment is based on the characteristics of the Site and surrounding area, as well as the key parameters of the Proposed Development detailed in **Chapter 3 – Site and Development Description**.
- 9.1.2 This Chapter is supported by, and should be read in conjunction with, the following Appendices:
- **Appendix E.1:** Phase 1 Ground Conditions Assessment
 - **Appendix E.2:** Minerals Resource Assessment Desk Study
- 9.1.3 This Chapter has been prepared by Stantec UK Ltd. In accordance with Regulation 17(4) of the Town and Country Planning (Environmental Impact Assessment) Regulations (Wales) 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix A.4**.

9.2 Policy Context, Legislation, Guidance and Standards

Legislation

Environmental Protection Act (1990)

- 9.2.1 Legislation on contaminated land is contained in Part 2A of the Environmental Protection Act, 1990⁹² (which was inserted into the 1990 Act by section 57 of the Environment Act 1995).
- 9.2.2 The Statutory Guidance that accompanies the legislation (Contaminated Land Statutory Guidance for Wales⁹³) provides a definition of what constitutes “contaminated land” and sets out the responsibilities of the Local Planning Authority (LPA) and Natural Resources Wales (NRW)⁹⁴ in the identification and management of contaminated land. The guidance also includes a definition of ‘risk’, where a risk is said to be a combination of “(a) *the likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land; and (b) the scale and seriousness of such harm or pollution if it did occur*”.

The Contaminated Land (Wales) (Amendment) Regulations (2012)

- 9.2.3 Further legislation on contaminated land in Wales is contained in the Contaminated Land (Wales) (Amendment) Regulations (2012)⁹⁵ which amend the Contaminated Land (Wales) Regulations (2006).

Environmental Damage (Prevention and Remediation) (Wales) Regulations (2009)

⁹² HMSO (2009), The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009

⁹³ Welsh Government (2012), Contaminated Land Statutory Guidance 2012, Available at: <https://www.gov.wales/contaminated-land-guidance-local-authorities>, Accessed February 2025

⁹⁴ Noting that the guidance refers to the “Environment Agency” as the guidance was prepared at a time when NRW were known as EA Wales. The guidance has not since been updated.

⁹⁵ HMSO (2012), The Contaminated Land (Wales) (Amendment) Regulations 2012



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- 9.2.4 The Environmental Damage (Prevention and Remediation) Regulations 2009⁹⁶ aim to prevent new land contamination that will damage water or health. These regulations also include enforcement procedures, including criminal sanctions, for breaches of the regulations.

Environmental Permitting (England and Wales) Regulations (2016)

- 9.2.5 The Environmental Permitting (England and Wales) Regulations 2016⁹⁷ cover the licensing of surface waters and groundwater abstractions and protect water resources through Source Protection Zones (SPZs).

Water Resources Act (1991)

- 9.2.6 The Water Resources Act 1991⁹⁸ aims to maintain and improve the quality of Controlled Waters (as defined in Part 3 of the Act). Part II of the Act covers the licencing of surface water and groundwater abstractions.

The Water Environment (Water Framework Directive) Regulations (2017)

- 9.2.7 The Water Framework Directive Regulations⁹⁹ establish a framework for the protection of surface waters and groundwater and to prevent the deterioration of WFD water bodies.

The Groundwater (England and Wales) Regulations (2009)

- 9.2.8 The Groundwater (England and Wales) Regulations 2009¹⁰⁰ cover potential groundwater contamination that could eventuate from spillages or disturbance of contaminated ground. As identified in **Appendix E.1**, sources of potential contamination have been identified within the Site, and the Proposed Development has the potential to create pollution risks during construction.

Guidance

- 9.2.9 Land Contamination Risk Management¹⁰¹, Environment Agency (2025) sets out the framework for Contaminated Land Risk Assessment which has been given due regard in the completion of the Ground Conditions Assessment, GCA, **Appendix E.1**.) and this Chapter,

National Planning Policy

Planning Policy Wales

- 9.2.10 Planning Policy Wales (PPW)¹⁰² sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales.

⁹⁶ HMSO (2009), The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009

⁹⁷ HMSO (2016), The Environmental Permitting (England and Wales) Regulations 2016

⁹⁸ HMSO (1991), The Water Resources Act 1991

⁹⁹ HMSO (2017), The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

¹⁰⁰ HMSO (2009), The Groundwater (England and Wales) Regulations 2009

¹⁰¹ Environment Agency (2025), Land Contamination Risk Management, Available at:

<https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>, Accessed February 2025

¹⁰² Welsh Government (2024), Planning Policy Wales, Available at: <https://www.gov.wales/planning-policy-wales>, Accessed February 2025



9.2.11 PPW states that “When considering development proposals planning authorities should take into account the nature, scale and extent of surface and subsurface hazards which may pose risks to health and environment, to ensure that:

- New development is not undertaken without an understanding of the risks, including those associated with the previous land use, pollution, groundwater, flood risk, subsidence, landslips, rock falls, mine and landfill gas emissions and rising groundwater from abandoned mines;
- Development does not take place without appropriate remediation or precautions;
- Consideration is given to the potential impacts which remediation of land, including land contamination, might have upon the natural and historic environment;
- Development is not allowed if expensive engineering projects, which have implications for the public purse, will be required to serve it, for example, to prevent erosion, or in the case of receding cliffs, if a site is likely to be affected by loss of land to the sea during its lifetime or if it could contribute to pollution at a later date; and
- Unstable land is restored to safeguard investment and, where possible, returned to productive use”.

“Planning authorities should take into account the nature, scale and extent of land contamination which may pose risks to health and the environment so as to ensure the site is capable of effective remediation and is suitable for its intended use. In doing so, development management decisions need to take into account:

- the potential hazard that contamination presents to the development itself, its occupants and the local environment; and
- the results of a specialist investigation and assessment by the developer to determine the contamination of the ground and to identify any remedial measures required to deal with any contamination”.

“Planning decisions will need to take into account:

- The potential hazard that instability could create to the development itself, to its occupants and to the local environment; and
- The results of a specialist investigation and assessment by the developer to determine the stability of the ground and to identify any remedial measures required to deal with any instability”.

Local Planning Policy

Conwy County Borough Council Local Development Plan 2007 – 2022

9.2.12 CCBC adopted the CCBC Local Development Plan¹⁰³ (LDP) in October 2013. The plan does not provide any specific policy in relation to the development of potentially contaminated land that is relevant to the Proposed Development¹⁰⁴.

¹⁰³ CCBC (2013), Conwy Local Development Plan 2007-2022, Available at: <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Adopted-Local-Development-Plan-LDP.aspx>, Accessed February 2025

¹⁰⁴ It is noted that Policy EMP/3 “new B1, B2 & B8 Office and Industrial Development on Non-Allocated Sites” notes that B1, B2 & B8 developments will be supported on non-allocated sites where (amongst other criteria) “it can be demonstrated that the proposal could not be accommodated on land allocated for the particular use or be



9.2.13 In relation to minerals resources the LDP contains the following policies:

- *Policy MWS/1 – Minerals And Waste*
 - This policy provides safeguarding of “reserves of hard rock” and “sand and gravel resources”, as well as designating buffer zones around existing quarries ... to “protect amenity and ensuring that mineral operations are not unduly constrained by other land users”.
- *Policy MWS/2 – Minerals*
- *“The existing quarries at Penmaenmawr, Raynes (Llysfaen) and St George will provide the Plan Area’s contribution to the regional supply of hard rock... Applications for future extraction of aggregate minerals in other locations including extensions to existing quarries, within the Plan Area will only be permitted where there is a need to maintain stocks of permitted reserves”.*
- *Policy MWS/3 – Safeguarding Hard Rock And Sand And Gravel Resources*
 - *“The following resources and related facilities are included within the Safeguarded Hard Rock or Sand and Gravel designation: ... d) The permitted reserves at St George Quarry, including processing areas; e) Additional hard rock as identified on the Proposals Map; f) Sand and Gravel resources as identified on the Proposals Map”.*
 - *“Planning permission will not be granted for any development within the Safeguarded Hard Rock or Sand and Gravel designation which could directly or indirectly harm the long-term viability of working those resources unless: a) It can be demonstrated that the need for development outweighs the need to protect the mineral resource or; b) Where such development would not have a significant impact on the viability of the mineral being worked or; c) Where the mineral is extracted prior to the development”.*
 - *“In cases where the quality and depth of safeguarded hard rock or sand and gravel resources has not been proven, other forms of development may be consistent with the safeguarding approach provided that the applicant submits evidence, such as borehole samples, demonstrating that no commercially viable hard rock or sand and gravel resources would be affected”.*
- *Policy MWS/4 – Quarry Buffer Zones*
 - *“There will be a presumption against inappropriate development within the quarry buffer zones”.*

9.2.14 As described in the Minerals Resource Assessment Desk Study (**Appendix E.2**) the Site is located within the area of safeguarded hard rock reserves but is not located within the area of any safeguarded sand and gravel deposits.

Denbighshire County Council Local Development Plan

9.2.15 DCC adopted the DCC LDP¹⁰⁵ in June 2013. The plan does not provide any specific policy in relation to the development of potentially contaminated land that is relevant to the Proposed Development.

located on a suitable brownfield site or building”. These categories are not however relevant to the Proposed Development.

¹⁰⁵ DCC (2013), Denbighshire County Council Local Development Plan 2006-2021, Available at: <https://www.denbighshire.gov.uk/en/planning-and-building-regulations/local-development-plan/adopted-local-development-plan.aspx>, accessed February 2025



9.2.16 As described in the Minerals Resource Assessment Desk Study (**Appendix E.2**) the Site is located within the area of safeguarded limestone deposits but is not located within the area of any safeguarded sand and gravel or gritstone deposits. On this basis only policies relevant to limestone are discussed below.

- *PSE15 – Safeguarding Minerals*
 - *“High quality resources of minerals, including limestone ... will be safeguarded from development that would result in its permanent loss or hinder future extraction. Development will only be permitted where:*
 - i) it can be demonstrated that the need for the development outweighs the need to protect the mineral resource; or*
 - ii) where such development would not have a significant impact on the viability of that mineral being worked; or*
 - iii) where the mineral is extracted prior to the development”.*
- *Policy PSE 16 - Mineral buffer zones*
 - *“Sensitive development within buffer zones, as defined on the proposals map, will not be permitted unless it can be demonstrated that working has ceased and will not be resumed”.*

Emerging Local Planning Policy

Conwy County Borough Replacement Local Development Plan

9.2.17 Whilst a draft text of the emerging Replacement LDP¹⁰⁶ is not yet publicly available, the Preferred Strategy document, list of candidate sites, and a series of topic papers and background papers have been produced to inform the plan. The relevant documents are described below.

Topic Paper 10: Minerals and Waste

- 9.2.18 The topic papers *“are designed to cover key subject areas currently covered in the adopted LDP and summarise technical data contained within the Background Papers to make the presentation of data more accessible to readers. Topic papers establish a baseline position and identify the key issues facing the County Borough which the RLDP will need to address”.*
- 9.2.19 The aim of this topic paper *“is to interpret the relevant evidence and guidance in relation to the specific topic and identify the key issues that the Plan will need to address as well as possible policy approaches to be incorporated in the Plan”.*
- 9.2.20 The topic paper describes potential changes to the existing minerals policies for the emerging Replacement LDP. As discussed above, the Minerals Resource Assessment Desk Study (**Appendix E.2**) shows that the Site is located within the area of safeguarded hard rock reserves but is not located within the area of any safeguarded sand and gravel deposits. On this basis, only policy changes related to hard rock reserves are discussed below.
- *Policy MWS/1 – Minerals And Waste*
 - No suggested changes

¹⁰⁶ CCBC (2025), Conwy Replacement Local Development Plan, Available at: <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Replacement-LDP/Replacement-Local-Development-Plan.aspx>, Accessed February 2025



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- *Policy MWS/2 – Minerals*
- *“This policy refers to the existing quarries at Penmaenmawr, Llysfaen (Raynes) and St George. It is likely that that a policy similar to this will be retained in the revised Local Development Plan”.*
- *Policy MWS/3 – Safeguarding Hard Rock And Sand And Gravel Resources*
 - *“The LDP safeguards sandstone with potential for high specification aggregate, which is identified as a Category 1 mineral within the Aggregate Safeguarding Maps ... Deposits within the County Borough are small, isolated, and in locations where development pressure is likely to be limited to agriculture and wind farm development. The application of a 200m buffer has resulted in relatively large areas being safeguarded which is unnecessary and disproportionate. Given the above, it is recommended that this mineral is no longer safeguarded through the LDP”.*

Background Paper 37: Minerals

9.2.21 The purpose of this paper is “to review the evidence base upon which the LDP was developed and to provide any additional evidence” to support the development of the Replacement LDP. The salient points relevant to the Proposed Development are summarised below.

- **Mineral Supply**
 - Limestone is extracted at St George’s Quarry, the planning permission is time limited, and extraction is required to cease by 2030. There are extensive reserves remaining and, notwithstanding the time limits attached to the planning permission, alongside the two other extraction sites within the County Borough, at current rates of production they would enable the County Borough to meet identified needs over the Review Plan Period and well beyond. It is considered highly likely that the existing sites will continue to be worked and that applications to extend the lives of the quarries would, in principle, be acceptable.
- *Policy MWS/2 states that the existing quarries at Penmaenmawr, Raynes and St George will provide the County’s contribution to the regional supply of hard rock, and this is considered to remain an appropriate position over the Review period. Both Raynes and St George would need an extension of time during the Review period (2018-2033), though this would not involve any additional landtake and would therefore not require an allocation in the LDP Review.*
- **Buffer Zones**
 - *“There are buffers around each of the quarries which helps minimise conflict between sensitive development and the quarrying operations. These buffer zones vary in extent due to the proximity of existing sensitive development but in general are 200m, ... It is considered that these buffers are an appropriate means of not only protecting sensitive development but also protecting strategically important quarries and should remain in place”.*

Preferred Strategy

9.2.22 The Preferred Strategy notes that the Replacement LDP will need to set out how it “ensures resilient locational choices for infrastructure and built development, taking into account water supplies, water quality and reducing, wherever possible, air and noise pollution and environmental risks, such as those posed by flood risk, coastal change, land contamination and instability”.

9.2.23 The Preferred Strategy states “Conwy contains high quality Carboniferous limestone running along the coastal strip from Abergele to The Great Orme in Llandudno... Minerals within resource categories 1(Primary) and 2 (Secondary) which are the best quality resources will be



safeguarded. It is not proposed to safeguard category 3 (Tertiary) resources on account of the large distribution of category 1 and 2 resources. The occurrence of sand and gravel is very limited in Conwy and is either located along the low-lying coastal strip and River Conwy valley and Estuary, or in isolated river valleys and pockets of glacial sand in boulder clay located in upland areas. Due to the small scale or narrow nature of many of these deposits, it is proposed to only safeguard deposits which exceed a defined threshold of size, as realistically the majority of such deposits are too small in scale or too isolated to justify safeguarding”.

9.2.24 Strategic Policy 33 (SP/33): Minerals of the preferred strategy states:

“The Council will manage the mineral resources in a sustainable manner which will support the construction economy, whilst safeguarding the natural and built environment by:

a) Ensuring that there is sufficient provision of permitted reserves of aggregates to meet local and regional supply needs throughout the duration of the Plan.

b) Identifying areas for future hard rock working, including potential extensions at existing quarries, and affording necessary long-term protection to prevent unnecessary sterilisation of resources which may be required during and beyond the Plan Period.

c) Encouraging the efficient and appropriate use of high-quality minerals and supporting proposals for the re-use and recycling of suitable materials as an alternative to primary won aggregates.

d) Designating buffer zones around quarries to protect amenity and ensuring that mineral operations are not unduly constrained by other land users.

e) Safeguarding sand & gravel and hard rock resources as identified on the proposals map and at existing permitted reserves of hard rock at Penmaenmawr, Raynes (Llysfaen) and St George Quarries.

f) Ensuring that minerals workings are appropriately restored at the earliest opportunity to enhance environmental, amenity and community benefits”.

9.2.25 Appendix 1 of the preferred strategy (list of retained, amended and new policies) indicates that all minerals policies from the adopted LDP will be retained and revised to incorporate the latest evidence base.

Candidate Sites

9.2.26 A review of the candidate sites shows that the majority are located a significant distance from the Proposed Development. Only Site 126 – Gofer, Rhuddlan Road, is located within 1.0 km of the Site, and comprises a parcel of land immediately north of the site. The status of this site is listed as “removed”.

9.2.27 The Candidate Sites Assessment Process document that accompanies the list of sites states that “Constraints may prevent a site from being used for one purpose (e.g. housing) but still suitable for other uses ... Once the complete list of developable sites and their relative constraints are known, the best sites in each location can be allocated for the purposes to which they are best suited ... Where this assessment indicates that a site is undevelopable, it will be removed from the site assessment process”.

Denbighshire County Council Replacement Local Development Plan



- 9.2.28 Whilst a draft text of the emerging Replacement LDP¹⁰⁷ is not yet publicly available. At the time of writing, the available information relating to the plan principally comprises a register of candidate minerals extraction sites for consideration in the replacement LDP.
- 9.2.29 A review of the candidate sites shows that the majority are located a significant distance from the Proposed Development. Of the candidate sites located within 1.0 km of the Site:
- Site CS-40E-028 (Bodelwyddan) comprises a parcel of land located approximately 320 m south of the PV array fields and approximately 460 m north-east of the Cable Corridor.
 - Site CS-31E-066 (Groesffordd Marli) comprises a parcel of land approximately 400 m south of the Cable Corridor.

Guidance

Development of Land Affected by Contamination: A Guide for Developers (2023)

- 9.2.30 The Welsh Land Contamination Working Group's 2023 guidance¹⁰⁸ "*Development of Land Affected by Contamination: A Guide for Developers*" outlines the information required by Local Planning Authorities (LPA) in order for them to determine planning applications and then the subsequent discharge of associated land contamination conditions. This guidance document provides an overview of good practice for land contamination management procedures which, if followed, will help meet the information requirements of the LPA during development of that land.

Environment Agency's Approach to Groundwater Protection (2018)

- 9.2.31 NRW refer, under "guidance on developing land affected by contamination" to the EA's 2018 document "*The Environment Agency's approach to groundwater protection*"¹⁰⁹. This document "*updates Groundwater protection: Principles and practice (GP3)*".
- 9.2.32 Section A of "*The Environment Agency's approach to groundwater protection*" (general principles) includes the following:

A1: Wherever legislation allows, the Environment Agency will use a tiered, risk-based approach to regulate activities that may impact groundwater resources and to prevent and limit pollution.

A2: Development must be appropriate to the sensitivity of the Site. Where the potential consequences of a development or activity are serious or irreversible the Environment Agency will adopt the precautionary principle to manage and protect groundwater. The Environment Agency will also apply this principle in the absence of adequate information with which to conduct an assessment.

A3: The Environment Agency encourages everyone whose activities may impact upon groundwater to consider the groundwater protection hierarchy in their strategic plans when

¹⁰⁷ DCC (2025), Denbighshire County Council Replacement Local Development Plan, Available at: <https://www.denbighshire.gov.uk/en/planning-and-building-regulations/local-development-plan/replacement-local-development-plan/replacement-local-development-plan.aspx>, Accessed February 2025

¹⁰⁸ Welsh Land Contamination Working Group (2023), Development of Land Affected by Contamination: A Guide for Developers, Available at: <https://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/advice-for-developers/land-contamination/?lang=en>, Accessed February 2025

¹⁰⁹ Environment Agency (2018), The Environment Agency's Approach to Groundwater Protection, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/692989/Envirnment-Agency-approach-to-groundwater-protection.pdf, Accessed February 2025



proposing new development or activities. The aim is to avoid potentially polluting activities being located in the most sensitive locations for groundwater”.

- 9.2.33 Section C of “*The Environment Agency’s approach to groundwater protection*” states the following:

“If national need for the provision and location of major developments overrides Environment Agency objections, the Environment Agency will raise its concerns and make every use of environmental impact assessment in addition to other measures to achieve environmental protection. Where developments receive approval against Environment Agency advice, it will apply section A - general protection position statements”.

9.3 Consultation

- 9.3.1 Consultation with NRW and the LPA Environmental Health Departments was undertaken as described within the Phase 1 GCA (**Appendix E.1**). No additional consultation to that undertaken to inform the Scoping Report (i.e., information requests to the Local Planning Authorities and NRW) has been carried out.

9.4 Methodology

- 9.4.1 This section sets out the Ground Conditions aspects that are scoped into and out of this Chapter, the technical methods used to determine the sensitivity of the receptors and magnitude of effects and sets out the significance criteria that have been adopted.

Aspects Scoped In

- 9.4.2 On the basis of the baseline conditions identified and the consultations undertaken the following aspects have been scoped into the assessment.

- Human health exposure to existing contamination in the ground, through ground disturbance during all phases;
- Mobilisation of existing contamination impacting on land and/or groundwater and/or surface water quality, during all phases; and
- Sterilisation / loss of safeguarded minerals.

Aspects Scoped Out

- 9.4.3 On the basis of the baseline conditions identified, the following aspects are scoped out of the assessment.

- Potential contamination introduced during the construction, operation or decommissioning of the Proposed Development. Effects arising from new contamination will be considered in other chapters if appropriate to each topic and within the construction, operational and decommissioning phase management plans.
- Geodiversity, as this receptor has not been identified within 0.25 km of the Site and (given the baseline conditions identified) it is not considered that mobilisation of potential existing contamination in the ground has the potential to impact geodiversity receptors at such a distance.
- Physical changes to hydrogeology and hydrology, e.g., changes to flow rates, flow paths, or groundwater levels. Such effects are considered by the appropriate specialists in **Chapter 6- Flood Risk and Water Resource**.



- Effects upon terrestrial ecology resulting from physical changes (vs. baseline) to groundwater or surface water. Any such impacts (if identified) are discussed within **Chapter 10- Biodiversity**.
- Mobilisation of existing contamination impacting on property. This is assessed in relation existing contamination from on-Site sources coming into contact with foundations of / migrating into new on-Site structures during the operational and maintenance phase, or to contamination migrating out of the Site and coming into contact with foundations / migrating into off-Site buildings during any phase. Other pathways such as damage due to ground borne vibrations or groundwater level change during or as a result of construction are outside the scope of this assessment and (if identified) would be considered in other chapters as appropriate.
- Effects to existing off-Site property receptors during all phases are scoped out on the basis that the on-Site Sources of Potential Contamination (SPCs) identified in the Phase 1 Ground Conditions Assessment (GCA) are limited to agrichemical residues associated with agricultural land; and
- Effects to proposed on-Site property during all phases are scoped out on the basis that:
 - On-site Sources of Potential Contamination (SPCs) have not been identified within 250 m of any proposed enclosed structure (e.g., the BESS); and
 - Where the Cable Corridor / PV arrays / other infrastructure are proposed within 250 m of an on-site SPC, the design of these elements will be informed by ground investigation, meaning that appropriate contamination-resistant materials will be utilised, should contamination be found to be present.

Study Area

- 9.4.4 The Study Area is the land within the Site (**Appendix A.1**) plus a surrounding distance depending on the likely zone of influence ('Zol') for each feature/receptor.
- 9.4.5 The distances used in this assessment, as summarised in the bullet points below, are based on professional judgement, knowledge of similar projects and the Design Manual for Roads and Bridges ('DMRB') LA 109 - Geology and Soils¹¹⁰, and LA 113 – Road Drainage and the Water Environment¹¹¹. Although not directly relevant to the Proposed Development, the study areas described in the list below generally accord with the study area recommended in Guidance for the Safe Development of Housing on Land Affected by Contamination.
- 9.4.6 The Phase 1 GCA (**Appendix E.1**) provides further information in relation to the relevant features identified within the Study Area.

Potentially Contaminative Land Uses

- 9.4.7 Land-use activities with the potential to generate contamination are based on a review of historical mapping for the Site, within a buffer of up to 250 m from the Site boundary.

Hydrogeology

¹¹⁰ National Highways, Transport Scotland, Welsh Government and NI Government Department for Infrastructure, 2019, Design Manual for Roads and Bridges – LA 109 Geology and Soils, Available at: <https://www.standardsforhighways.co.uk/search/adca4c7d-4037-4907-b633-76eae30b9c0>, Accessed February 2025

¹¹¹ National Highways, Transport Scotland, Welsh Government and NI Government Department for Infrastructure (2019), Design Manual for Roads and Bridges – LA 113 Road Drainage and the Water Environment, Available at: <https://www.standardsforhighways.co.uk/search/d6388f5f-2694-4986-ac46-b17b62c21727>, Accessed February 2025



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- 9.4.8 The majority of the Proposed Development comprises either solar PV arrays most likely to be constructed on pile-driven or screw-mounted foundations (to a maximum depth of approximately 1-2 m), or the Cable Corridor, comprising cables constructed in shallow trenches (typically to a depth of 1-2 m).
- 9.4.9 It is considered that the likelihood of the Proposed Development impacting abstractions (in relation to chemical quality) is very limited as shallow groundwater that could be potentially utilised for potable supply within the near-surface Secondary Undifferentiated diamicton and tidal flat deposit aquifers is not anticipated to be present.
- 9.4.10 On this basis a search buffer of 250 m has been selected for the identification of groundwater abstractions (including private water supplies) and groundwater Source Protection Zones (SPZs) for areas of the Site to be used either as solar PV arrays or as the Cable Corridor.
- 9.4.11 The BESS Site may include structures with piled foundations. The British Geological Survey (BGS) indicate that the BESS Site land parcel is underlain by deposits of Diamicton which, elsewhere within the vicinity of the Proposed Development, has been shown to be predominantly cohesive and in excess of 12 m thick (likely more than this, noting that the base of the stratum was not proven). Whilst potentially contaminative current and historical land uses have not been identified within this land parcel, there remains the potential for any piled foundations, if they were to be used, to impact groundwater quality (if they were to penetrate the Diamicton, and extend into the underlying mudstone, siltstone and sandstone of the Warwickshire Group and the limestone of the Clwyd Limestone Group), e.g., via increased turbidity during installation, or via migration of concrete bleed waters. A search buffer of 250 m around the POC and BESS has been used for the identification of groundwater abstractions (including private water supplies) and groundwater SPZs.

Hydrology

- 9.4.12 The majority of the Proposed Development comprises either solar PV arrays constructed on pile-driven or screw-mounted foundations, or the Cable Corridor comprising cables constructed in shallow trenches. Furthermore, on-site SPCs have not been identified (beyond agrichemical residues resulting from long-term agricultural use of land).
- 9.4.13 On this basis, the likelihood of the Proposed Development impacting upon hydrology is considered to be very limited.
- 9.4.14 A search buffer of 100 m from the red line boundary of the Solar Site and Cable Corridor, and 250 m from the red line boundary of the BESS Site has been selected for the identification of hydrological receptors, and 250 m for the National Grid Substation and BESS Site.

Minerals Resources

- 9.4.15 The Study Area for safeguarded mineral resources is the Site boundary on the basis that the on-Site minerals are those which will be temporarily sterilised by the construction of the Proposed Development.
- 9.4.16 The Study Area for safeguarded existing mineral extraction or infrastructure sites, minerals site allocations, minerals consultation areas or minerals areas of search is the Site boundary plus 250 m.

Baseline Data Collection

- 9.4.17 Baseline conditions have been gathered from the desk-based information presented in the Phase 1 GCA (**Appendix E.1**) and Minerals Resource Assessment Desk Study (**Appendix E.2**) which should be read in conjunction with this Chapter.



9.4.18 The GCA has been prepared following the guidance given in the EA's Land Contamination Risk Management¹¹² guidance and presents the following:

- A preliminary investigation comprising a desk-based study of published and readily available public information including historical OS maps and aerial photographs;
- A preliminary ground stability appraisal and initial identification of potential ground condition constraints to development; and
- A Preliminary Risk Assessment (Tier 1 PRA) which is a qualitative assessment of data to develop a conceptual model ('CM') including the identification of potentially contaminative current and historical activities on-Site and off-Site and source pathway-receptor pollutant linkages.

9.4.19 The reports were prepared in 2025, the baseline year.

Assessment

Receptor Sensitivity

9.4.20 The table below presents the importance / sensitivity / value criteria for the potential receptors scoped into this assessment.

Table 9.1: Receptor Value / Importance / Sensitivity Criteria

Value / Importance / Sensitivity	General Criteria
Very High Very high importance, sensitivity and rarity. International scale and limited potential for substitution.	Contamination: 1) Human health. Very high sensitivity land use such as residential or allotments. 2) Hydrology. A watercourse having a Water Framework Directive (WFD) overall status of High. Surface Water Drinking Water Protection Area. The hydrological receptor is designated as having international importance, such as Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar Sites. 3) Hydrogeology. Any of the following apply: • Principal aquifer providing a regionally important resource, e.g. public water supply, industrial supply. • Groundwater quality associated with SPZ 1. • Nearest abstraction (including private water supplies) is within 50m of the Site. Minerals: Existing mineral sites and infrastructure.
High High importance, sensitivity and rarity. National scale and limited potential for substitution.	Contamination: 1) Human health. High sensitivity land use such as public open space, and construction workers. 2) Hydrology. A watercourse having a WFD overall status of High. The hydrological receptor is designated as having national importance, such as Sites of Special Scientific Interest (SSSIs). 3) Hydrogeology. Any of the following apply: • Principal aquifer providing a locally important resource, e.g. public water supply, spray irrigation, top up water etc. • Groundwater quality associated with SPZ 2, or a private water supply.

¹¹² Environment Agency (2025), Land Contamination Risk Management, Available at: <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>, Accessed February 2025



Value / Importance / Sensitivity	General Criteria
	Nearest active abstraction (including private water supplies) from the stratum in question is between 50m and 250m from the Site. Minerals: Mineral Preferred Areas (MPA) identified in the relevant minerals local plan.
Medium Medium importance, sensitivity and rarity. Regional scale, limited potential for substitution.	Contamination: - Human health. Medium sensitivity land use such as commercial or industrial. - Hydrology. A watercourse having a WFD ecological or chemical classification of Good. Site protected at a local level. - Hydrogeology. Any of the following apply: - Secondary Aquifer. - Groundwater quality associated with SPZ 3. - Nearest active abstraction (including private water supplies) from the stratum in question is between 250m to 500m from the Site. Minerals: Mineral Safeguarded Areas (MSA) and/or Mineral Consultation Area (MCA).
Low Low importance, sensitivity and rarity. Local scale.	Contamination: - Human health. Low sensitivity land use such as highways and rail. - Hydrology. A watercourse having a WFD ecological classification of Moderate to Poor and/or a Good chemical status. Site protected at local level or not protected. - Hydrogeology. All of the following apply: - Secondary B or Secondary Undifferentiated Aquifer. - Site is not located within an SPZ. - Nearest active abstraction (including private water supplies) from the stratum in question is between 500m to 1km from the Site. Minerals: A mineral resource that is safeguarded elsewhere within the county, present but outside of any MSA/MCA.
Negligible Very low importance, sensitivity and rarity. Local scale.	Contamination: - Human health. Undeveloped surplus land/no sensitive land use proposed. - Hydrology. A Watercourse having a WFD ecological classification of Bad and/or a chemical status of Fail. - Hydrogeology. All of the following apply: - Unproductive Stratum (i.e., a non-aquifer). - Site is not located within an SPZ. - Abstractions (including private water supplies) not identified within 1km. Minerals: No mineral resource identified.
Notes: 1. It is noted that the sensitivity criteria for hydrological receptors are the same for High and Very High. This is because Chapter 6: Flood Risk and Water Resources, from which this chapter takes direction for sensitivity of hydrological receptors, uses a four-point (High, Medium, Low, Negligible) scale for sensitivity, whilst this Ground Conditions and Contaminated Land chapter uses a five-point scale (Very High, High, Medium, Low, Negligible).	

Magnitude of Impact



9.4.21 The criteria used to determine the magnitude of change/impact for Ground Conditions and Contaminated Land are set out in the table below.

Table 9.2: Proposed Criteria for Classifying Magnitude of Impact

Magnitude	General Criteria
Large	Contamination Adverse: The historical and current land uses at the Site (and where relevant migration pathways are present, within the area surrounding the Site) are considered to be such that there is potential for concentrations of contamination substantially in excess of the threshold criteria for the protection of human health and the environment to be widespread, and (in absence of any mitigation or remediation) that mobilisation or exposure during construction, operation or decommissioning could result in significant harm¹¹³ arising to a designated receptor. Remediation is likely to be required in the short term to prevent harm occurring. Contamination Beneficial: Substantial betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation which a) lowers the quantum of contamination present in the ground / groundwater / surface water relative to the baseline condition, or b) removal of existing or potential polluting discharge to groundwater, such that there is unlikely to be potential for concentrations of contamination substantially in excess of the threshold criteria for the protection of human health and the environment to be widespread, and (in absence of any mitigation or remediation) that mobilisation of contamination or exposure to contamination during construction, operation or decommissioning is unlikely to result in significant harm¹¹³ arising to a designated receptor. Minerals Resource Adverse: Loss of resource and/or quality and integrity of resource. Severe damage to key characteristics, features or elements. Minerals Resource Beneficial: Large scale or major improvement of resource quality, extensive restoration, major improvement of attribute quality.
Medium	Contamination Adverse: The historical and current land uses at the Site (and, where relevant, migration pathways are present, within the area surrounding the Site) are considered to be such that there is potential for concentrations of contamination slightly in excess of the threshold criteria for the protection of human health and the environment to be widespread, and locally for substantially elevated concentrations to be present. In the absence of any mitigation or remediation, mobilisation or exposure to contamination during construction, operation or decommissioning could result in harm arising to a designated receptor. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Remediation of soil and/or groundwater is unlikely to be required, however control or mitigation measures may be required e.g. pathway breaks, excavation of hotspots etc. to reduce risks to human health or controlled waters, or to make the land suitable for its intended use. Contamination Beneficial: Moderate betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation such that there is unlikely to be potential for concentrations of contamination slightly in excess of the threshold criteria for the protection of human health and the environment to be widespread, and locally for substantially elevated concentrations to be present. Following betterment it is unlikely that in the absence of any mitigation or remediation, mobilisation of contamination or exposure to

¹¹³ Significant harm includes death, disease, serious injury, genetic mutation, birth defects or impairment of reproductive function. Other health effects may also constitute significant harm such as physical injury; gastrointestinal disturbances; respiratory tract effects; cardio-vascular effects; central nervous system effects; skin ailments; effects on organs such as the liver or kidneys; or a wide range of other health impacts. Whether or not these would constitute significant harm would depend on the seriousness of harm including impact on health, quality of life and scale of impact.



Magnitude	General Criteria
	contamination during construction, operation or decommissioning could result in harm arising to a designated receptor. Minerals Resource Adverse: Loss of resource, but not adversely affecting the integrity. Partial loss of/damage to key characteristics, features or elements. Minerals Resource Beneficial: Benefit to, or addition of, key characteristics, features or elements. Improvement of attribute quality.
Small	Contamination Adverse: The historical and current land uses at the Site (and where relevant migration pathways are present, within the area surrounding the Site) are considered to be such that there is potential for concentrations of contamination in excess of the threshold criteria for the protection of human health and the environment to be locally present. In absence of any mitigation or remediation, mobilisation or exposure to contamination during construction, operation or decommissioning could result in harm arising to a designated receptor but it is likely that this harm, if realised, would at worst normally be mild. Remediation of soils and/or groundwater is unlikely to be required, and mitigation is likely to be provided by best-practice measures. Contamination Beneficial: Slight betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation which lowers the quantum of contamination present in the ground / groundwater / surface water relative to the baseline condition such that there is unlikely to be potential for concentrations of contamination in excess of the threshold criteria for the protection of human health and the environment to be locally present. Following betterment it is unlikely that, in absence of any mitigation or remediation, mobilisation of contamination or exposure to contamination during construction, operation or decommissioning could result in harm arising to a designated receptor. Minerals Resource Adverse: Some measurable change in attributes, quality or vulnerability. Minor loss of, or alteration to key characteristics, features or elements. Minerals Resource Beneficial: Minor benefit to, or addition of key characteristics, features or elements. Some beneficial impact on attribute or reduced risk of negative impact occurring.
Very Small	Contamination: Contamination levels substantially below human health and environment assessment criteria and remediation is not required. No requirement for control measures to reduce risks to human health or to make land suitable for intended use. The historical and current land uses at the Site (and where relevant migration pathways are present, within the area surrounding the Site) are considered to be such that there is only limited potential for concentrations of contamination slightly in excess of the threshold criteria for the protection of human health and the environment to be locally present. In absence of any mitigation or remediation, mobilisation or exposure to contamination during construction, operation or decommissioning is unlikely to result in harm arising to a designated receptor. If such harm were to arise it is unlikely to be severe. There is unlikely to be a requirement for control measures to reduce risks to human health and controlled waters, or to make the land suitable for intended use. Minerals Resource Adverse: Very minor loss or detrimental alteration to characteristics, features or elements. Minerals Resource Beneficial: Very minor benefit to, or positive addition of characteristics, features or elements.
Negligible	No discernible change from baseline conditions.



Magnitude	General Criteria
	No discernible loss, alteration of characteristics, features or elements. No observable impact, neither positive nor negative.

Significance of Effects

9.4.22 It is proposed to derive the significance of effects using the matrix below. This will be supplemented by professional judgement, which where applicable will be explained to give the rationale behind the values assigned.

Table 9.3: Matrix for Assigning Significance of Effect (Adapted from IEMA, 2011¹¹⁴)

Receptor Importance / Value / Sensitivity	Magnitude of Effect				
	Large	Medium	Small	Very Small	Negligible
Very High	Major	Moderate	Minor	Negligible / No Effect	Negligible / No Effect
High					
Medium	Major	Moderate	Minor	Negligible / No Effect	Negligible / No Effect
Low					
Very Low	Major	Moderate	Minor	Negligible / No Effect	Negligible / No Effect

9.4.23 Effects of Major and Moderate significance are considered Significant in EIA terms. Effects of Minor or Negligible significance are considered Not Significant in EIA terms.

Limitations

9.4.24 This Ground Conditions Chapter will consider existing contamination in the ground only. The introduction of new contamination during the construction, operational and decommissioning phases, and any 'physical effects' e.g., changes to groundwater or surface water flow paths, elevation etc. will be discussed in Chapter 6 Flood Risk and Water Resources.

9.4.25 Historical maps and aerial photographs provide a 'snapshot' in time of conditions or activities at the Site and cannot be relied upon as indicators of any events or activities that may have taken place at other times. It is possible for developments to have occurred between surveys that are not shown or for the map record to have been censored for military security.

¹¹⁴ IEMA (2011), Special Report: The State of Environmental Impact Assessment Practice in the UK



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- 9.4.26 The absence of cavity records in the natural and mining cavities (non-coal) databases is not considered conclusive as to the absence of these features.
- 9.4.27 Legislation changes (i.e., a change in what is an acceptable contamination concentration in the environment) could mean that areas previously not designated as Contaminated Land (as defined by Part 2a of the Environmental Protection Act 1990) then become designated as Contaminated Land.
- 9.4.28 Where the proposed Cable Corridor is required to cross a road, watercourse, woodland, or other element of the built or natural environment within which it is not possible to construct the cable by open trenching, it is assumed that the cable will be constructed using trenchless methods such as pipe-jacking or horizontal directional drilling (HDD).
- 9.4.29 The PV arrays are assumed to be most likely to be constructed on foundations of one of the following types:
- Driven piles - metal posts with a typical footprint of approximately 0.0012 - 0.0014 m², driven to a typical depth of around 1-2 m below ground level ('bgl') and a maximum depth of up to 2 - 4 m bgl using a low-earth pressure tracked piling machine; or,
 - Use of ballast to weigh down the frameworks. This option is non-intrusive and uses concrete blocks or another form of ballast to anchor the frameworks. This option would only be utilised in the unlikely event that the archaeological evaluation currently underway identifies a requirement for concrete blocks as mitigation to protect buried archaeology of national importance.
- 9.4.30 Other mounting types that are less likely to be utilised, or that could be utilised in limited areas depending upon the ground conditions (e.g. areas where shallow embedment is necessary) comprise:
- Cast in-situ shallow concrete foundations;
 - Anchored piles – a mounting system utilising four 'rods', driven to shallow depth (typically less than 2 m bgl) at approximately 45 degrees into the ground using hand tools, at the base of each post of the PV array framework; and
 - Screw piles – Ground anchors that are 'screwed' into the ground using an attachment for an excavator.
- 9.4.31 Any excess arisings generated during construction of the Proposed Development will be dealt with in line with standard best practice and current legislation.

9.5 Baseline Conditions

- 9.5.1 Baseline conditions have been gathered from the desk-based information presented in the Phase 1 GCA (**Appendix E.1**) and Minerals Resource Assessment Desk Study (**Appendix E.2**). The Phase 1 GCA has been prepared following the guidance given in Land Contamination Risk Management (LCRM)^{xxi} and presents the following:
- A preliminary investigation comprising a desk-based study of published and readily-available public information including historical OS maps and aerial photographs;
 - A preliminary ground stability appraisal and initial identification of potential ground condition constraints; and
 - A Preliminary Risk Assessment (Tier 1 PRA) which is a qualitative assessment of data to develop a conceptual site model (CSM) including the identification of potentially contaminative current and historical activities on-Site and off-Site and source-pathway-receptor pollutant linkages.



Geology

9.5.2 The following British Geological Survey (BGS) geological maps of England and Wales¹¹⁵ have been reviewed, alongside the BGS' GeoIndex online map viewer¹¹⁶.

- Sheet 107, Denbigh (Solid and Drift), 1:50,000 scale, 1973.
- Sheet 95, Rhyl (Solid alongside Drift), 1:63,360 scale, 1970.

9.5.3 The superficial deposits and bedrock that are anticipated to be present within the Study Area for the Proposed Development are shown on Figure 2: Superficial Geology and Figure 3: Bedrock Geology of the Phase 1 GCA (**Appendix E.1**) and are summarised in the table below.

Table 9.4: Superficial Deposits and Bedrock Geology Present on-Site, as Recorded by the BGS

Stratum	BGS Description	Areas Present
Superficial Deposits		
Tidal Flat Deposits – Clay, Silt and Sand	<i>"unconsolidated sediment, mainly mud and/or sand"</i> .	Land Parcels 1, 2, 3, 4 and 5 Northern-most 40 m of cable route
Till, Devensian – Diamicton	<i>"Clay and silty clay, commonly pebbly and sandy, stiff, possibly interbedded with sand and gravel-rich lenses and rare peat"</i> .	Land Parcels 1, 2, 3, 4, 5 and 6 - potentially at surface along the southern boundary of Land Parcels 1 to 5 and all of Land Parcel 6. BESS and POC Majority of the Cable Route
Bedrock Geology		
Kinnerton Sandstone Formation – Sandstone	<i>"dominantly aeolian ... sandstone, red-brown to yellow, generally pebble-free, fine- to medium-grained, cross-stratified"</i> .	Present beneath superficial deposits across majority of Land Parcel 3 and northern half of Land Parcel 5
Warwickshire Group – Mudstone, Siltstone and Sandstone	<i>"predominantly red, brown or purple-grey sandstone, siltstone and mudstone, some grey strata, coals not common, local conglomerates, localised beds of Spirorbis limestone"</i> .	Present beneath superficial deposits across all of Land Parcels 1, 2, 4 and 6, southern quarter of Land Parcel 3 and southern half of Land Parcel 5. Present beneath superficial deposits across Majority of BESS and POC with the exception of an approximately 70 m wide section extending from the south-western corner. (present beneath the overlying Kinnerton Sandstone in the remainder of Land Parcels 3 and 5). Present beneath superficial deposits across northern-most 680 m and southern-most 600 m of Cable Route.

¹¹⁵ BGS (2025), Geological Survey of England and Wales, New Series 1:63,360 / 1:50,000 scale geological map series, Available at: <https://webapps.bgs.ac.uk/data/MapsPortal/series.html?collection=PMAP&series=E50k>, Accessed February 2025.

¹¹⁶ BGS (2025), GeoIndex Onshore viewer, Available at: <https://mapapps2.bgs.ac.uk/geoindex/home.html>, Accessed February 2025.



Stratum	BGS Description	Areas Present
Clwyd Limestone Group – Limestone	<i>“a diverse range of limestone facies with subordinate sandstone and mudstone units, and exhibiting local dolomitization”.</i>	Present beneath superficial deposits across the majority of cable route with the exception of the northern-most 680 m and southern-most 600 m, and an approximately 70 m wide section of the BESS and POC.

Geodiversity

- 9.5.4 Geodiversity covers SSSIs that are designated for geological purposes, which are statutory designated sites. Geo-conservation also covers non-statutory designated sites such as Local Geological Sites (LGS), Regionally Important Geological Sites (RIGS) and County Geodiversity Sites (CGS).
- 9.5.5 As described in the Phase 1 GCA (**Appendix E.1**), there are no RIGS or geologically designated SSSI located within 250 m of the Site.

Hydrogeology

Aquifer Designations

- 9.5.6 As described in the Phase 1 GCA, the aquifer designations, as classified by NRW for the various strata underlying the Site are provided in the table below. These are consistent across the whole site wherever these strata are present.

Table 9.5: Aquifer Designations

Stratum	Description	Areas Present
Superficial Deposits		
Tidal Flat Deposits	Secondary Undifferentiated Aquifer	Land Parcels 1 to 5 Northern-most 40 m of cable route
Diamicton	This classification is applied by NRW ‘where it is not possible to attribute either category A or B to a rock type. These layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type’.	Land Parcels 1 to 5 (beneath overlying tidal flat deposits) and Land Parcel 6 BESS and POC Cable Route
Bedrock Geology		
Kinnerton Sandstone Formation – Sandstone	Principal Aquifer	Present beneath superficial deposits across majority of Land Parcel 3 and northern half of Land Parcel 5
Clwyd Limestone Group – Limestone	Defined by NRW as “geology that exhibit high irregular and/or fracture permeability. They usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale”.	Present beneath superficial deposits across all of Land Parcels 1, 2, 4 and 6, southern quarter of Land Parcel 3 and southern half of Land Parcel 5. Present beneath superficial deposits across Majority of BESS and POC with the exception of an approximately 70 m wide section extending from the south-western corner. Present beneath superficial deposits across northern-most 680 m and southern-most 600 m of Cable Route.



Stratum	Description	Areas Present
Warwickshire Group – Mudstone, Siltstone and Sandstone	Secondary A Aquifer Defined by NRW as “ <i>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</i> ”.	Present beneath superficial deposits across the majority of cable route with the exception of the northern-most 680 m and southern-most 600 m, and an approximately 70 m wide section of the BESS and POC.

Groundwater Abstractions

- 9.5.7 Active permitted abstractions (i.e., abstractions which extract more than 20 cubic metres of water a day) have not been identified within 250 m of any part of the Site.
- 9.5.8 CCBC and DCC have both confirmed that there are no known non-permitted private water supplies (i.e., abstractions which extract less than 20 cubic metres of water a day) located within 250 m of any part of the Site.

Groundwater Source Protection Zones

- 9.5.9 The Site is not located within a groundwater Source Protection Zone and no such zones are present within 250 m of any part of the Site.

Hydrology

Surface Water Features & Operational Catchments

BESS Site

- 9.5.10 There are no statutory Main Rivers located within 250 m of the BESS Site.
- 9.5.11 Historical and contemporary OS mapping records a ditch along part of the eastern boundary of the BESS Site. This ditch appears to be isolated and does not connect to a wider network of ditches.
- 9.5.12 The Welsh Government’s DataMapWales¹¹⁷, showing the “*Water Framework Directive – River Waterbody Catchments Cycle 3*” layer, shows the BESS Site to be located within the “Pont Robin Cut (Bodelwyddan)” water body, which received a WFD classification of Poor for ecological quality and High for chemical quality.

Solar Site and Cable Corridor

- 9.5.13 The Bodoryn Cut which runs along the northern boundary of the Solar Site is classified by NRW as a statutory Main River. It is likely that the Bodoryn Cut provides drainage of the Tidal Flat Deposits.
- 9.5.14 The historical and contemporary OS mapping records a series of field drains / ditches within the Solar Site that appear to connect and flow north towards the Bodoryn Cut.
- 9.5.15 Further small streams and ponds are present within Kinmel Park Wood, through which the Cable Corridor passes.
- 9.5.16 The Welsh Government’s DataMapWales indicates that the Solar Site and Cable Corridor cross several catchments, as detailed in the table below:

¹¹⁷ Welsh Government (2025), DataMapWales, Available at: <https://datamap.gov.wales/>, Accessed February 2025



Table 9.6: Summary of Surface Water Body Information – Land Parcels and Cable Corridor

Water Body Name / Reference	Description
Gele (Solar Site, 5.3 km of Cable Corridor (running south from Land Parcel 1))	2018 WFD classification of Moderate for Ecological quality and Good for Chemical quality. The watercourse to which this WFD water body relates is the River Gele, located some 600 m to the north of the Site.
Pont Robin Cut (Bodelwyddan) (Remainder of the Cable Corridor 2.4 km, running north from the BESS Site)	2018 WFD classification of Poor for Ecological quality and Good for Chemical quality. The watercourse to which this WFD water body relates is an un-named tributary of the River Clywd, located some 3 km to the north of the Site.

Surface Water Abstractions

- 9.5.17 There are no recorded licenced surface water abstractions within 250 m of any part of the entire Site.

Terrestrial Ecology

- 9.5.18 Further information relating to terrestrial ecology is presented in **Chapter 10: Biodiversity**. It should be noted that whilst impacts upon terrestrial ecology receptors resulting from mobilisation of existing contamination at the Site are within the scope of this Chapter, physical effects on terrestrial ecology and impacts on terrestrial ecology resulting from the introduction of new contamination during the construction and operational phases are outside of the scope of this Chapter. It is also noted that there is no removal of trees as part of the Proposed Development and hedgerow loss is minimal (i.e. required for vehicle access bellmouth widening). Any potential impacts during construction and any mitigation required is set out in the submitted oCEMP (**Appendix A.5**).
- 9.5.19 As described in the Phase 1 GCA (**Appendix E.1**), there are no designated SSSI, SAC, SPA, Local or National Nature Reserves, wetlands of international importance as designated under the Ramsar Convention within 1 km of the BESS Site or within 250 m of the Solar Site or the Cable Corridor. Seven areas of designated ancient woodland have been identified within 250 m of the Site, several of which are located immediately adjacent to the Site as described in Section 3.6 of **Appendix E.1** and replicated below.
- A restored ancient woodland located immediately east of Land Parcels 4 and 5 and immediately west of Land Parcel 6.
 - A restored ancient woodland immediately north of the Cable Route beneath Glascoed Road, to the west of the junction with Engine Hill.
 - A restored ancient woodland immediately south-west and 120 m north of the Cable Route within Kinmel Park Wood (noting that Kinmel Park Wood itself is not designated as ancient woodland).
 - Ancient woodland immediately north of the Cable Route beneath an un-named access road, at the junction with Primrose Hill.
 - Ancient woodland approximately 40 m south of the Cable Route, on the western edge of St George's Quarry.



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- Ancient woodlands approximately 140 m north, 200 m north and 180 m east of the Cable Route beneath Glascoed Road.
- Ancient woodland located approximately 140 m east of the BESS and POC Land Parcel.

Property

- 9.5.20 Part 2A of the Environmental Protection Act 1990 and the accompanying Statutory Guidance define property as “crops, including timber, produce grown domestically, or on allotments, for consumption, livestock, other owned or domesticated animals, or wild animals which are the subject of shooting or fishing rights” and “any structure or erection, and any part of a building including any part below ground level, but does not include plant or machinery comprised in a building, or buried services such as sewers, water pipes or electricity cables”. The descriptions of ‘harm’ to the property receptors within the Statutory Guidance also includes Scheduled Ancient Monuments. LCRM further widens this definition, requiring assessment of “archaeological or heritage sites such as scheduled ancient monuments”. On this basis, all statutorily designated archaeological sites are included within the Property receptor. Further information relating to built heritage and archaeology is presented within **Chapter 12 – Built Heritage**.
- 9.5.21 Within the scope of this assessment, the potential for the Site to present a hazard to buildings (property), including statutorily designated archaeological receptors considers the migration of existing contamination from on-site sources only, e.g., if existing contamination within the Site were to migrate and come into contact with foundations, contaminated dusts were to blow to an adjacent site, or ground gases from an on-site source were to migrate into an off-site building and increase the risk of explosion. Other pathways for potential harm to be caused to property (buildings) receptors, such as damage due to ground borne vibrations or groundwater level change during or as a result of construction are outside the scope of this assessment.
- 9.5.22 The Site is surrounded by agricultural land, with occasional farms and residential properties.
- 9.5.23 There are no World Heritage Sites, Scheduled Ancient Monuments or National Parks within 250 m of the Solar Site, the Cable Corridor, or the BESS Site.
- 9.5.24 There are two Listed Buildings within 50 m of the Site, located adjacent to the southern boundary of Land Parcel 1, beyond Rhuddlan Road, and between the eastern boundary of Land Parcel 2 and the western boundary of Land Parcel 3.
- 9.5.25 An approximately 3.5km length of the Cable Corridor between Primrose Hill and Engine Hill is located within Kinnel Park, a registered park and garden.

Potential Ground Conditions Hazards

Potentially Contaminative Land Uses

- 9.5.26 The majority of the Site appears to have remained as undeveloped/agricultural land since the earliest reviewed historical mapping in the late 1800s and accordingly, on-Site SPCs within the BESS Site, the Solar Site and the Cable Corridor are limited to agrichemicals (residues only) associated with a long-standing history of agricultural use.
- 9.5.27 There are discrete off-Site areas within the Study Area that have a history of potentially contaminative land use or where the current land use is potentially contaminative (i.e., a SPC is present). Where SPCs are identified and where a viable pathway exists between the source and an identified receptor, the SPC has been taken forwards for assessment. The locations of these SPCs are presented on Figure 4 of the Phase 1 GCA (**Appendix E.1**) and are summarised in the tables below.



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Table 9.7: Sources of Potential Contamination – BESS Site

SPC Reference	Description and Hazard Classification Score	Location	Potential Contaminants of Concern (COC)
On-Site			
1	Agricultural land. The majority of the land within the Site appears to have remained as agricultural land since the 1870s	All	Agrichemical Residues (not bulk storage)
Off-Site			
2	Farms – there are multiple historical and modern farms located in the immediate vicinity of the Site. There is the potential for bulk storage of fuels and agrichemicals to have taken place within the farms.	Various around Site	Petroleum hydrocarbons (fuels/oils), agrichemicals, asbestos in construction materials
12	St. Asaph Business Park – Predominantly commercial units including offices, police station, ambulance and lifeboat service training facilities, small-scale manufacturing.	Nearest units are approximately 30 m north	Petroleum hydrocarbons (fuels / oils), Polycyclic Aromatic Hydrocarbons (PAHs), Volatile and Semi-Volatile Organic Compounds (VOCs and SVOCs), Poly- and Per-Fluoroalkyl Substances (PFAS).
13	Large National Grid Substation – HCS assigned reflects the recent construction and managed operational controls.	Immediately east of BESS Site	Petroleum hydrocarbons

Table 9.8: Potential Sources of Contamination – Land Parcels 1 to 6 and Cable Corridor

SPC Reference	Description	Location	Potential Contaminants of Concern (COC)
On-Site			
1	Agricultural land. The majority of the land within the Site appears to have remained as agricultural land since 1871.	All	Agrichemical Residues (not bulk storage)
Off-Site			
2	Farms – there are multiple historical and modern farms located in the immediate vicinity of the Site. There is the potential for bulk storage of fuels and agrichemicals to have taken place within the farms.	Various around Site	Petroleum hydrocarbons, agrichemicals
3	Former Lime Works, later used as minerals processing area associated with main quarry pit located approximately 500 m to the south.	Immediately south of the Cable Corridor at approximate National Grid Reference (NGR) 296900 E, 376260 N	Petroleum hydrocarbons (fuels/oils)
4	Gas works – was a small gas works from late 1800s to 1960, and following this the building appears to have been converted to a residential property.	Immediately adjacent to the Cable Corridor	Petroleum hydrocarbons, BTEX, halogenated compounds, organic solvents, phenols, polyaromatic hydrocarbon (PAHs), metals,



SPC Reference	Description	Location	Potential Contaminants of Concern (COC)
			cyanides (free, complex and total), sulphate, sulphide and asbestos
5	Landfill (Gofer Refuse Tip) – indicated to have been operated by 'Aberconwy District Council' and 'Urban District Council of Abergele' between 1970 and 1985.	Immediately north-west of Land Parcel 2 and approximately 100 m north-east of Land Parcel 1	Landfill gases (methane, carbon dioxide, hydrogen sulphide) Metals, petroleum hydrocarbons, PAHs, asbestos, volatile and semi-volatile organic compounds, inorganic compounds (ammoniacal nitrogen, cyanide, chloride etc.)
6	Waste bulking station – effective since 2011 and operated by Conwy County Borough Council, permitting the transfer of household, commercial and industrial wastes.	Immediately north east of Land Parcel 1	Petroleum hydrocarbons, metals, asbestos, PAHs, inorganic compounds (ammoniacal nitrogen, cyanide, chloride etc.)
7	Existing skip yard/waste transfer station – effective since 1994 and operated by Thorncliffe Building Supplies Ltd and historically by Windmill Ltd, allowing for commercial and industrial waste.	Approximately 90 m to the north of Land Parcel 1	Petroleum hydrocarbons, metals, asbestos, PAHs, inorganic compounds (ammoniacal nitrogen, cyanide, chloride etc.)
8	Existing household waste recycling centre – effective since 2005 and operated by Environmental Waste Controls Ltd, allowing for the removal of both commercial and industrial wastes.	Approximately 130 m north of Land Parcel 1	Petroleum hydrocarbons, metals, asbestos, PAHs, inorganic compounds (ammoniacal nitrogen, cyanide, chloride etc.)
9	Fuel filling stations	Approximately 130 m east and 220 m north-east of Cable Corridor.	Petroleum hydrocarbons (fuels / oils), PAHs, Volatile and Semi-Volatile Organic Compounds (VOCs and SVOCs)
10	Recycled plastic products factory	Approximately 250 m north-east of Cable Corridor	Petroleum hydrocarbons (fuels / oils), PAHs, VOCs and SVOCs, Poly- and Per-Fluoroalkyl Substances (PFAS), phthalates.
11	Historical Lead Mine	Adjacent to Land Parcel 5 within inset part of the parcel's eastern boundary	Lead

Unexploded Ordnance (UXO)

9.5.28 As described in the Phase 1 GCA, the UXO Desk Study and Risk Assessment¹¹⁸ identifies that for the majority of the site, including the Solar Site and the BESS Site and most of the Cable Corridor, the UXO hazard is “Low”. A section of the Cable Corridor to the south-west of Kinmel Park Camp has been assessed as being “Moderate” UXO hazard. The potential UXO hazard identified in this “Moderate” hazard area is identified as land service ammunition (LSA) e.g., grenades, mortars, pyrotechnics, and small arms ammunition (SAA).

¹¹⁸ Zetica Ltd. (2025), UXO Desk Study and Risk Assessment ref: P15181-25-R1 Rev A,



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- 9.5.29 In areas of Low UXO hazard, Zetica Ltd. recommend a formal UXO awareness briefing for staff involved in excavations, and do not identify constraints associated with boreholes/piling or horizontal directional drilling and pipe jacking.
- 9.5.30 In areas of Moderate UXO hazard, Zetica Ltd. recommend a formal UXO awareness briefing for all staff involved in excavations and a non-intrusive survey and clearance of identified UXO hazards in the Moderate UXO hazard area prior to intrusive works.
- 9.5.31 On the basis of adoption of the above, the likelihood of the potential UXO risks being realised is reduced to As Low As Reasonably Possible (ALARP).

Radon

- 9.5.32 Recommendations regarding radon protection measures would apply only to proposed occupied structures and therefore the assessment of potential radon hazards is focussed on land where the BESS Site are proposed to be located.
- 9.5.33 The majority of the BESS Site is located within an area where less than 1% of homes exceed the UK Health Security Agency (UKHSA) radon action level of 200 Bq/m³. A limited area in the south-west of the BESS Site is located within an area where between 1% and 3% of homes exceed the UKHSA Action Level.
- 9.5.34 Radon is not identified as a potential hazard requiring mitigation in the context of the Proposed Development.

Instability Hazards

- 9.5.35 Instability hazards considered at the Site have been divided into naturally occurring geological hazards (including collapsible ground, compressible ground, dissolution features, landslides, running sands, shrinking/swelling clay), and hazards arising from historical land use.
- 9.5.36 The Phase 1 GCA summarises the potential for naturally occurring geological hazards to occur within the Site as follows:

Table 9.9: Naturally Occurring Geological Hazards

Hazard	Hazard Potential	Comment
Collapsible Ground Stability	Very Low to Low	On the basis of the information reviewed, the ground conditions are expected to be such that a rapid reduction in volume is not expected to occur when they are loaded and saturated with water
Compressible Ground Stability	Very Low (Cable Corridor and BESS Site) Moderate to High (Land Parcels 1 to 6)	On the basis of the information reviewed, the ground conditions are expected to be such that layers of very soft compressible materials such as organic clay or peat are not expected to be present beneath the Cable Corridor and the BESS Site which are predominantly underlain by Diamicton. In these areas, a Very Low hazard potential has been assigned. Land Parcels 1 to 6 are shown by the BGS to be underlain by Tidal Flat Deposits, which typically comprise organic rich, soft clay. In these areas a Moderate to High hazard potential has been assigned.
Dissolution	Moderate	See Natural Cavities section below.
Landslide Ground Stability	Very Low	The BGS interactive viewer landslide layer shows that the Site is not located on or within 100 m of mapped landslides. The topography within the Site and across the surrounding area falls to the north and north-east towards the River Clywd. Land Parcels 1 to 6 appear to be approximately level at an approximate elevation of 4 m AOD whereas the BESS Site are at an approximate elevation of 45 to 50 m AOD rising across the parcel north to south. The potential for landslide hazards is considered to be Very Low for the majority of the Site, noting that localised areas of the Cable



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Hazard	Hazard Potential	Comment
		Corridor may have ground conditions where the landslide hazard are considered to be Moderate
Running Sand	Very Low (Cable Corridor and BESS Site) Moderate (Land Parcels 1 to 6)	Land Parcels 1 to 6 are underlain by Tidal Flat Deposits, described by the BGS as “a <i>heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape</i> ”. These deposits may be water bearing with groundwater within the depth of typical foundation excavations, and there is assessed to be a Moderate hazard potential for running sand to occur in these areas, in any excavations beneath the water table. It is noted that within Land Parcels 1 to 6 the proposed development principally comprises PV arrays on shallow piled foundations, however there may be a requirement for cables within shallow trenches, or for kiosks/transformers on shallow / ground bearing foundations. The BESS Site and the majority of the Cable Corridor are located in areas underlain by Diamicton which has been found in BGS archive exploratory hole records to be predominantly cohesive is not anticipated to be water bearing. Running sands are not anticipated in excavations within this stratum, and the hazard potential for parts of the Site underlain by Diamicton is therefore Very Low.
Shrinking or Swelling Clay	Low to High	The cohesive Diamicton that forms the surface geology across the majority of the Site is expected to be of typically of low to medium volume change potential. Upper weathered layers are anticipated to be typically of medium volume change potential and the in-situ non-weathered material is anticipated to be of typically low volume change potential. The volume change potential of Tidal Flat Deposits is typically highly variable, depending upon the sand content (sandy clay is typically lower volume change potential) and the organic content (e.g., peaty clay is typically moderate to high).

Natural and Mining Cavities

Natural Cavities

- 9.5.37 There is one recorded natural cavity located within 250 m of the Site. This feature called “St. George’s Cave” comprises a “solution widened joint or fissure” and is located approximately 140 m to the south of the Cable Corridor within the limestone quarry processing area. Further features are located at distance from the Site within the area underlain by the Clwyd Limestone Group, including a sinkhole and a swallow hole recorded approximately 1.4 km to the south of the Cable Corridor. Vadose cave features are recorded approximately 2.6 km to the west of Solar Site Land Parcel 1.
- 9.5.38 The geomorphology of the area is such that water flowing down from the higher land to the south of the Site, underlain by the less permeable Elwy Formation (mudstone, siltstone and sandstone) flows onto land underlain by the Clwyd Limestone. Across geological time, water flowing through limestone slowly dissolves the rock, widening joints and fissures and creating cave systems.
- 9.5.39 Overall, based on the ground conditions, the geomorphology of the Site and the presence of similar karstic dissolution features in the surrounding area the potential for natural cavities to be present beneath the Site is considered to be Moderate.

Historical Mineral Working

- 9.5.40 There are multiple historical mining features located within the vicinity of the Site. Predominantly these features are located to the south of the Cable Corridor and BESS Site, within the area underlain by bedrock Clywd Limestone Group, with the nearest off-Site feature being an historical lead mine immediately south of the Solar Site within an inset of Land Parcel 5’s eastern boundary, and a further historical lead mine located approximately 220 m to the south of Glascoed.



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- 9.5.41 St. George's quarry has been present immediately south of the Cable Corridor since approximately the late 1930s / early 1940s with the main quarry pit some 500 m to the south.
- 9.5.42 The historical mapping also records multiple "old shaft", "old shaft (lead)", "air shaft" and "old lead mine" within 500 m of the Cable Corridor to the south of Kinmel Park Wood / Glascoed. Similar historical mining features have not been identified on, or in the vicinity of Land Parcels 1 to 6 or the BESS Site.
- 9.5.43 Overall, based on the ground conditions, the geomorphology of the Site, the potential for unrecorded man-made mineral excavations to be present is considered to be Moderate to High.

Minerals Resources

- 9.5.44 Information relating to minerals resources is provided within **Appendix E.2** (Minerals Resource Assessment Desk Study). The information in the minerals desk study relating to safeguarded mineral resources is summarised below.
- 9.5.45 The CCBC and DCC LDPs have been reviewed, alongside the relevant information relating to the emerging replacement LDPs.
- 9.5.46 The Solar Site is shown to not be located within any area of safeguarded mineral deposits.
- 9.5.47 The Cable Corridor, from approximately 750 m south of Solar Site Land Parcel 1 to the BESS Site is shown to be located in an area of safeguarded hard rock reserves (within CCBC) or within a Minerals Safeguarding Area (MSA) for limestone (within DCC). The majority of the BESS Site is similarly located within a MSA for limestone.
- 9.5.48 The presence of the Cable Corridor and BESS Site will sterilise minerals on parts of the Site, however, the sterilisation is considered temporary in nature (with the exception of the BESS and POC) and insignificant given the vast extent of the Clwyd Limestone Group across both the Conwy and Denbighshire counties
- 9.5.49 It is not considered that construction of the cable within areas of existing road would sterilise mineral resources, as the minerals beneath and in the immediate vicinity of the road would already be considered sterilised. Similarly, minerals beneath areas of existing woodland would not be considered sterilised as the woodland (including areas of designated ancient woodland) would likely prevent the extraction of minerals.
- 9.5.50 Whilst the Cable Corridor and BESS Site are located within areas of safeguarded limestone, the extant minerals policy documents recognise that the existing quarries provide sufficient resource (subject to extensions of permissions, "*which would, in principle be acceptable*") to meet the material requirements across the current plan periods.
- 9.5.51 On this basis and given the absence of any candidate sites for the extraction of limestone within the vicinity of the Proposed Development, it is considered highly unlikely that the limited quantities of limestone temporarily sterilised by the Proposed Development would be desirable for extraction during the operational phase.
- 9.5.52 It is further noted that the need to remove the potentially significant thickness (BGS archive exploratory hole logs indicate a thickness of in excess of 11 m) of Diamicton overburden to allow prior extraction of the limited quantities of limestone temporarily sterilised by the Proposed Development would likely make prior extraction non-viable.
- 9.5.53 It is noted that the Cable Corridor passes through the St. George Quarry buffer zone. The purpose of the buffer zone is to "*protect amenity and ensuring that mineral operations are not unduly constrained by other land users*". The Proposed Development within the buffer zone comprises only a cable within a shallow trench which, in the areas closest to the quarry is beneath an existing road. On this basis, the construction of the cable within the buffer is not considered to constrain the operation of the existing quarry.



- 9.5.54 The Proposed Development is not considered to sterilise off-site minerals in the land surrounding the Site.

Baseline Evolution

- 9.5.0 The foreseeable future baseline conditions existing at the Site in 2027 (which is the earliest potential construction start for the Proposed Development), without the implementation of the Proposed Development (or any other development on or in the vicinity of the Site) are unlikely to differ from the conditions identified in 2025.

9.6 Primary and Tertiary Mitigation

- 9.6.1 The Primary and Tertiary (i.e. embedded) mitigation comprises the measures that are intrinsic to and built into the design of the Proposed Development and measures that are standard or best practice within the industry.
- 9.6.2 The embedded mitigation relevant to Ground Conditions is summarised below.

Primary Mitigation

Construction

- Layout optimisation of the Proposed Development to avoid sensitive features / receptors, as far as is practicable, such as identified sources of potential contamination.
- Layout optimisation of the Proposed Development to locate structures away from areas of potential land instability hazards, as far as is practicable, such as compressible ground (e.g., alluvium and peat), steep slopes, mine entries etc.
- Layout optimisation of the cable route within the Cable Corridor to avoid, as far as is reasonably practicable, the St. George's Quarry buffer zone.
- Intrusive ground investigations and assessment will be undertaken prior to construction. The results of the ground investigation will be used to inform the geotechnical and geoenvironmental elements of the design of the Proposed Development.
- Appropriate training of construction and maintenance workers in the handling and use of potentially hazardous substances and the associated risks.
- The control of earthworks or materials movement (including any re-use of materials) will only be undertaken in accordance with appropriate Environmental Permits, exemptions, or the CL:AIRE The definition of Waste: The development industry Code of Practice (CL:AIRE, 2011¹¹⁹).

¹¹⁹ CL:AIRE (2011), The Definition of Waste: Development Industry Code of Practice, Available at: <https://www.claire.co.uk/Projects-and-initiatives/dow-cop/28-framework-and-guidance/111-dow-cop-main-document>, Accessed February 2025.



- Any temporary dewatering activities during construction will be undertaken in accordance with NRW guidance (Environment Agency, 2023¹²⁰; NRW, 2025¹²¹; NRW, 2025¹²²) (including appropriate assessment undertaken as required by the guidance (Environment Agency, 2007¹²³)), and if required, an Abstraction Licence and Environmental Permit (for the discharge) will be obtained. Such works will be limited to the depth and time required to facilitate construction activities.
- Foundation Works Risk Assessment (FWRA) will be undertaken for the BESS, National Grid Substation and any other structures requiring deep foundations / piling. The FWRA(s) will be undertaken post-consent and will be informed by the results of the ground investigation undertaken in the area of the proposed structures for which FWRA is required.
- At trenchless crossings, and where otherwise indicated in the ES, a Hydrogeological Risk Assessment (HRA) will be undertaken post-consent to assess the specific risks to groundwater and groundwater receptors (including the risk of breakout of drilling fluids, where appropriate) at those locations and identify any additional mitigation or remediation that may be required. The nature and scope of any mitigation or remediation will be agreed with the Environment Agency or other stakeholders, as appropriate. The HRA will be informed by the results of the ground investigation undertaken in the area of the proposed trenchless crossings.

Operation and Decommissioning

- 9.6.3 Primary mitigation for the operational phase and decommissioning phases is not proposed. It is noted that the effects of the embedded mitigation may often be realised at the construction phase, e.g., the removal of contaminated soils (if encountered) during construction means that human health receptors during the operational phase will not encounter contamination.

Tertiary Mitigation

Construction

- Appropriate training of construction and maintenance workers in the handling and use of potentially hazardous substances and the associated risks.
- The National Grid Substation will be constructed, operated and maintained by National Grid, who will not permit the substation and external electrical equipment to be built if it will not be safe for and from the environment, in respect of ground conditions.
- The ES will be supported by an oCEMP. The oCEMP will outline how the construction of the Proposed Development will avoid, minimise, or mitigate effects on the environment and surrounding area and will include measures such as:

¹²⁰ Environment Agency (2023), Temporary dewatering from excavation to surface water, Available at: <https://www.gov.uk/government/publications/temporary-dewatering-from-excavations-to-surface-water/temporary-dewatering-from-excavations-to-surface-water>, Accessed February 2025. It is noted that whilst this is an EA Regulatory Position Statement, NRW note that "we apply the guidance for England... to Wales" (<https://naturalresources.wales/permits-and-permissions/water-discharges-and-septic-tanks/discharges-to-surface-water-and-groundwater/find-out-if-you-need-a-permit-for-discharges-to-surface-water-and-groundwater/?lang=en>).

¹²¹ Natural Resources Wales (2024), Environmental Permits, Available at: <https://naturalresources.wales/permits-and-permissions/environmental-permits/?lang=en>, Accessed February 2025.

¹²² Natural Resources Wales (2025), Water Discharge and Groundwater Activity Exemptions, Available at: <https://naturalresources.wales/permits-and-permissions/water-discharges-and-septic-tanks/discharges-to-surface-water-and-groundwater/water-discharge-and-groundwater-activity-exemptions/?lang=en>, Accessed February 2025.

¹²³ Environment Agency (2007), Hydrogeological impact appraisal for dewatering abstractions. It is noted that whilst this is an EA guidance document, it is listed as "relevant guidance and best practice" by NRW (<https://naturalresources.wales.gov.uk/permits-and-permissions/water-abstraction-and-impoundment/groundwater-investigation-consent/?lang=en>)



- An awareness briefing regarding ground conditions and appropriate methods of working to limit disturbance of potentially contaminated soil or water, where possible. The methods will be informed by the findings of the targeted ground investigation.
 - Measures to minimise exposure to contaminated soils e.g., by controlling dust generation and the adoption of good hygiene standards will prevent prolonged skin contact, inhalation, and ingestion of soils during construction.
 - Measures to minimise and control runoff/leaching to Controlled Waters.
 - Measures to protect soils, such as the use of tracked or low ground pressure machines (i.e., with large tyres), to impose low pressures on the soil – analogous to farming machinery. Vehicle tracking routes should be devised which minimise repeat journeys over the Site to reduce rutting and damage to the vegetation and soil structure.
 - Vegetation disturbance should be minimised as much as possible and any bare ground resulting from construction should be re-seeded. On completion of the works the fields will be tilled using light farming machines and prepared appropriately for seeding to encourage early native vegetation growth, restoration of the soil structure and natural creation of an environment to encourage native meadow plants to flourish.
 - Prevention measures including maintenance of construction vehicles, bunded storage, designated wheel washing areas, settling basins, screening stockpiles of materials, and dampening exposed soils as appropriate.
- A commitment to best practice measures for the construction of trenchless crossings, e.g., a drilling fluid breakout plan.
- The Construction (Design and Management) Regulations 2015¹²⁴ (CDM) regulate the health, safety and welfare of construction projects and will apply to the Proposed Development. A Principal Designer and a Principal Contractor ('PC') will be appointed to plan, manage, monitor, and coordinate health and safety during the pre-construction and construction phases, respectively. The PC will have responsibility for ensuring legislative compliance and obtaining all permits/licenses as required. The CDM Regulations require a pre-construction information pack ('PCIP') to be provided by the Applicant (the 'Client' under CDM) or by the Principal Designer if the Client delegates this duty. The pack contains all information that is held or is readily available. The PCIP will be used by the PC to prepare construction and decommissioning phase risk assessments and method statements. The risk assessments will be informed by the findings of ground investigations undertaken at the Site.
- Occupational health and safety measures e.g., Personal Protective Equipment (PPE), and statutory health and safety compliance (e.g., compliance with the Confined Spaces Regulations, 1997¹²⁵ in relation to ground gas from working in confined spaces/trenches) will minimise the risks associated with potential contamination.
- The ES will be supported by an outline Decommissioning Environmental Management Plan (oDEMP). The oDEMP will provide a framework for the future decommissioning of the Proposed Development and restoration of the land. It is anticipated that a framework will be provided to reflect the amount of time that will elapse between the construction of the Proposed Development and the time at which a document suite would be required for the management of environmental effects associated with its decommissioning. In respect of existing contamination in the ground, the construction of the Proposed Development will resolve certain known-unknowns, e.g., the potential for unexpected contamination which, if encountered during construction, will be managed and remediated appropriately such

¹²⁴ HMSO (2015), The Construction (Design and Management) Regulations 2015

¹²⁵ HMSO (1997), The Confined Spaces Regulations 1997



that hazards present during construction are unlikely to be present during decommissioning.

- A protocol for dealing within any unexpected contamination will be developed by the Contractor and will include
 - a) details of a watching brief and toolbox talks to be implemented throughout the construction phase,
 - b) details regarding how any affected area will be delineated, protected, investigated and assessed,
 - c) the qualifications and competencies of the person appointed to oversee the works,
 - d) the preparation of a method statement for how the contamination will be dealt with or remediated (as appropriate), e) an escalation policy describing when and how any notifications and approvals will be agreed with the Local Planning Authority (LPA) and
 - f) details of verification procedures for any mitigation or remediation works.

Operation and Decommissioning

- 9.6.4 Tertiary mitigation for the operational and decommissioning phases is not proposed. It is noted that the effects of the embedded mitigation may often be realised at the construction phase, e.g., the removal of contaminated soils during construction means that human health receptors during the operational phase will not encounter contamination.

9.7 Assessment of Likely Significant Effects

Receptor Identification

- 9.7.1 This section identifies the receptors considered within this assessment. The identification of receptors is informed by the Phase 1 GCA (**Appendix E.1**).

Human Health

- 9.7.2 The identified human health receptors are as follows.

Table 9.10: Summary of Human Health Receptors and Assigned Sensitivity

Receptor	Comment	Assigned Sensitivity
Human Health – On-Site	Construction and decommissioning – Ground workers constructing or decommissioning the Proposed Development. Operation – Workers and maintenance staff operating the completed development.	High (4)
Human Health – Off-Site	Residents of adjacent properties	Very High (5)

Hydrology

- 9.7.3 As described within Chapter 6: Flood Risk and Water Resource, the receptors within the Study Area that could be impacted by the construction of the Proposed Development (during all phases) in relation to water quality are provided in the table below.



Table 9.11: Summary of Hydrology Receptors and Assigned Sensitivity

Water Body	Assigned Sensitivity
Gele (Water body reference: GB110066059980)	Medium
Pont Robin Cut (Bodelwyddan) (Water body reference: GB110066059970)	Medium
Note: Identified surface water receptors and the assigned sensitivity of these water receptors has been taken from Chapter 6: Flood Risk and Water Resources chapter.	

Hydrogeology

9.7.4 The identified hydrogeology receptors are as follows.

Table 9.12: Summary of Hydrogeology Receptors and Assigned Sensitivity

Stratum	Aquifer Classification	SPZ Present	Nearest Abstraction from this Stratum	Assigned Sensitivity
Superficial Deposits				
Tidal Flat Deposits – Clay, Silt and Sand	Secondary Undifferentiated Aquifer	None on site or within 250 m	No active permitted abstractions or private water supplies recorded on, or within 250 m of the site.	Low
Till, Devensian – Diamicton	Secondary Undifferentiated Aquifer	None on site or within 250 m	No active permitted abstractions or private water supplies recorded on, or within 250 m of the site.	Low
Bedrock Geology				
Kinnerton Sandstone Formation – Sandstone	Principal Aquifer	None on site or within 250 m	No active permitted abstractions or private water supplies recorded on, or within 250 m of the site.	Very High
Warwickshire Group – Mudstone, Siltstone and Sandstone	Secondary An Aquifer	None on site or within 250 m	No active permitted abstractions or private water supplies recorded on, or within 250 m of the site.	Medium
Clwyd Limestone Group – Limestone	Principal Aquifer	None on site or within 250 m	No active permitted abstractions or private water supplies recorded on, or within 250 m of the site.	Very High

Minerals Resources

9.7.5 The identified minerals resources receptors are limited to the on-site safeguarded limestone deposits as shown on the policy maps that accompany the CCBC and DCC LDPs. These receptors are assigned a sensitivity of Medium.

9.7.6 It is recognised that the Cable Corridor passes through the buffer zone for St. George Quarry. This buffer zone is not itself a mineral resource, however it seeks to prevent mineral operations from being unduly constrained by other land users. The current minerals policy associated with this buffer zone states that “*there will be a presumption against inappropriate development within the quarry buffer zones*”. The Proposed Development within the buffer zone comprises only an underground cable within a shallow trench which, in the areas closest to the quarry is beneath an existing road. On this basis, the construction of the cable within the buffer is not considered to be inappropriate and is not considered to constrain the operation of the existing quarry, and the detailed alignment of the cable route (within the 10m Cable



Corridor) can easily be designed post-determination so as to ensure no conflicts in that respect.

Preliminary Assessment of Likely Significant Effects

Construction Phase

Human Health – On-Site

- 9.7.7 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to on-site health receptors from the identified on-Site SPCs during the construction phase. A low risk to on-Site human health receptors from the identified off-Site SPCs was identified during the construction phase.
- 9.7.8 With the inclusion of the embedded mitigation measures described above, the potential construction phase effects on the identified on-Site human health receptors (**High** sensitivity) from any pre-existing contamination are considered to be of a **Very Small** magnitude of impact are assessed as **Minor Adverse**. These effects are **Not Significant** and **Temporary**.

Human Health – Off-Site

- 9.7.9 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to off-site health receptors from the identified on-Site SPCs during the construction phase¹²⁶.
- 9.7.10 With the inclusion of the embedded mitigation measures described above, the potential construction phase effects on the identified off-Site human health receptors (**Very High** sensitivity) from any pre-existing contamination originating within the Site are considered to be of a **Very Small** magnitude of impact and are assessed as **Minor Adverse**. These effects are **Not Significant** and **Temporary**.

Hydrology

- 9.7.11 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to the identified hydrology receptors during the construction phase.
- 9.7.12 With the inclusion of the embedded mitigation measures described above, the potential construction phase effects on the identified hydrology receptors (**Medium** sensitivity) from any pre-existing contamination associated with the on-Site SPCs are considered to be of a **Very Small** magnitude of impact and are assessed as **Minor Adverse**. These effects are **Not Significant** and **Temporary**.

Hydrogeology

- 9.7.13 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to the identified hydrogeology receptors during the construction phase.
- 9.7.14 With the inclusion of the embedded mitigation measures described above, the potential construction phase effects on the identified hydrogeology receptors (**Low to Very High** sensitivity) from any pre-existing contamination associated with on-Site SPCs are considered to a of a **Very Small** magnitude of impact and are assessed as **Minor Adverse**. These effects are **Not Significant** and **Temporary**.

Minerals Resources

- 9.7.15 With the inclusion of the embedded mitigation measures described above, the potential construction phase effects on the identified minerals resources receptors (**Medium** sensitivity)

¹²⁶ The risks to off-site human health receptors from off-Site SPCs are beyond the scope of this assessment.



from construction are considered to be of a **Very Small** magnitude of impact and are assessed as **Negligible**. These effects are **Not Significant** and **Temporary**.

Operational Phase

Human Health – On-Site

- 9.7.16 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to on-site human health receptors from the identified on-Site SPCs during the operational phase. A low risk to on-Site human health receptors from the identified off-Site SPCs was identified during the operational phase.
- 9.7.17 With the inclusion of the embedded mitigation measures described above, the potential operational phase effects on the identified on-Site human health receptors (**High** sensitivity) from any pre-existing contamination are considered to be of a **Very Small** magnitude of impact and are assessed as **Negligible**. These effects are **Not Significant** and **Temporary**.
- 9.7.18 This effect has been assessed as Negligible (vs. the Minor Adverse effect identified during the construction phase) on the basis that the design of the Proposed Development will have been informed by ground investigation, such that potential ground conditions hazards will have been mitigated. In addition, the quantum of works involving ground disturbance during the operational phase will be substantially less than during the construction phase.

Human Health – Off-Site

- 9.7.19 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to off-site health receptors from the identified on-Site SPCs during the operational phase¹²⁷.
- 9.7.20 With the inclusion of the embedded mitigation measures described above, the potential operational phase effects on the identified off-Site human health receptors (**Very High** sensitivity) from any pre-existing contamination originating within the Site are considered to be of a **Very Small** magnitude of impact and are assessed as **Negligible**. These effects are **Not Significant** and **Temporary**.
- 9.7.21 This effect has been assessed as Negligible (vs. the Minor Adverse effect identified during the construction phase) on the basis that the quantum of works involving ground disturbance during the operational phase will be substantially less than at the construction phase, and therefore the potential for exposure to the very limited on-site hazards is significantly reduced vs. the construction phase.

Hydrology

- 9.7.22 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to the identified hydrology receptors during the operational phase.
- 9.7.23 With the inclusion of the embedded mitigation measures described above, the potential operational phase effects on the identified hydrology receptors (**Medium** sensitivity) from any pre-existing contamination associated with the on-Site SPCs are considered to be of a **Very Small** magnitude of impact and are assessed as **Negligible**. These effects are **Not Significant** and **Temporary**.
- 9.7.24 This effect has been assessed as Negligible (vs. the Minor Adverse effect identified during the construction phase) on the basis that the quantum of works involving ground disturbance during the operational phase will be substantially less than at the construction phase, and therefore the potential for mobilisation of existing contamination during the operational phase is significantly reduced vs. the construction phase.

Hydrogeology

¹²⁷ The risks to off-site human health receptors from off-Site SPCs are beyond the scope of this assessment.



Environmental Statement

- 9.7.25 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to the identified hydrogeology receptors during the operational phase.
- 9.7.26 With the inclusion of the embedded mitigation measures described above, the potential operational phase effects on the identified hydrogeology receptors (**Low to Very High** sensitivity) from any pre-existing contamination associated with on-Site SPCs are considered to be of a **Very Small** magnitude of impact and are assessed as **Negligible**. These effects are **Not Significant** and **Temporary**.
- 9.7.27 This effect has been assessed as Negligible (vs. the Minor Adverse effect identified during the construction phase) on the basis that ground disturbance during the lifespan of the Proposed Development will likely be limited to shallow works only, e.g., the excavation of new service trenches or the replacement of new PV arrays. These works are not anticipated to impact the deeper Principal and Secondary A aquifers beneath the Diamicton (Secondary Undifferentiated Aquifer), and in absence of any on-Site SPCs (other than agricultural residues resulting from long-term agricultural use) the potential hazards are highly limited.

Minerals Resources

- 9.7.28 During operation, the presence of the Cable Corridor and BESS Site will sterilise minerals on parts of the Site, noting that the sterilisation is temporary in nature, limited to the lifetime of the Proposed Development (for 40 years).
- 9.7.29 Furthermore:
- It is not considered that construction of the cable within areas of existing road would sterilise mineral resources, as the minerals beneath and in the immediate vicinity of the road would already be considered sterilised.
 - Minerals beneath areas of existing woodland would not be considered sterilised as the woodland (including areas of designated ancient woodland) would likely prevent the extraction of minerals, although it is noted that the Proposed Development does not impact or result in the loss of any existing woodland including Ancient Woodland.
 - The extant minerals policy documents recognise that the existing quarries provide sufficient resource (subject to extensions of permissions, "*which would, in principle be acceptable*") to meet the material requirements across the current plan periods.
 - Prior extraction of minerals beneath the Proposed Development would likely be non-viable due to potentially significant thickness (BGS archive exploratory hole logs indicate a thickness of in excess of 11 m) of Diamicton overburden.
 - The Cable Corridor is not considered to be an inappropriate development within the St. George Quarry buffer zone and would not constrain the extraction of minerals within the quarry during the lifetime of the Proposed Development.
- 9.7.30 Given the above, and the absence of any candidate sites for the extraction of limestone within the vicinity of the Proposed Development, it is considered highly unlikely that the limited quantities of limestone temporarily sterilised by the Proposed Development would be desirable for extraction during the operational phase. The magnitude of impact is therefore considered to be Negligible, resulting in a **Negligible** effect that is **Temporary** and **Not Significant**.

Decommissioning Phase

Human Health – On-Site

- 9.7.31 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to on-site health receptors from the identified on-Site SPCs during the decommissioning phase. A low risk to on-Site human health receptors from the identified off-Site SPCs was identified during the decommissioning phase.



Environmental Statement

- 9.7.32 With the inclusion of the embedded mitigation measures described above, the potential decommissioning phase effects on the identified on-Site human health receptors (**High** sensitivity) from any pre-existing contamination are considered to be of a **Very Small** magnitude of impact and are assessed as **Minor Adverse**. These effects are **Not Significant** and **Temporary**.

Human Health – Off-Site

- 9.7.33 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to off-site health receptors from the identified on-Site SPCs during the decommissioning phase¹²⁸.
- 9.7.34 With the inclusion of the embedded mitigation measures described in Section 9.6 above, the potential decommissioning phase effects on the identified off-Site human health receptors (**Very High** sensitivity) from any pre-existing contamination originating within the Site are considered to be of a **Very Small** magnitude of impact and are assessed as **Minor Adverse**. These effects are **Not Significant** and **Temporary**.

Hydrology

- 9.7.35 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to the identified hydrology receptors during the decommissioning phase.
- 9.7.36 With the inclusion of the embedded mitigation measures described above, the potential decommissioning phase effects on the identified hydrology receptors (**Medium** sensitivity) from any pre-existing contamination associated with the on-Site SPCs are considered to be of a **Very Small** magnitude of impact and are assessed as **Minor Adverse**. These effects are **Not Significant** and **Temporary**.

Hydrogeology

- 9.7.37 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to the identified hydrogeology receptors during the decommissioning phase.
- 9.7.38 With the inclusion of the embedded mitigation measures described above, the potential decommissioning phase effects on the identified hydrogeology receptors (**Low to Very High** sensitivity) from any pre-existing contamination associated with on-Site SPCs are considered to be of a **Very Small** magnitude of impact and are assessed as **Minor Adverse**. These effects are **Not Significant** and **Temporary**.

Minerals Resources

- 9.7.39 With the inclusion of the embedded mitigation measures described above, the potential decommissioning phase effects on the identified minerals resources receptors (**Medium** sensitivity) are considered to be of a **Very Small** magnitude of impact and are assessed as **Negligible**. These effects are **Not Significant** and **Temporary**.

9.8 Secondary Mitigation and Enhancement

- 9.8.1 The assessment has concluded that there are no likely significant effects in relation to the identified human health, hydrology, hydrogeology, minerals resources and peat soils receptors. Therefore, no additional mitigation is required.

9.9 Residual Effects

- 9.9.1 In absence of any additional mitigation, the assessment of preliminary residual effects is the same as the preliminary assessment of likely significant effects.

¹²⁸ The risks to off-site human health receptors from off-Site SPCs are beyond the scope of this assessment.



9.10 Cumulative Effects

9.10.1 The approach to cumulative assessment considers whether the Site is within a Zol associated with contamination or instability. This is informed by professional judgement and consideration of the following:

- Release of contaminated dust – typical wind direction and distance;
- Release of contaminated water – flow direction;
- Release of ground gases or volatile vapours – typical wind direction and distance for above ground releases and a maximum of 250m for below ground; and
- Alterations to adjacent or nearby ground levels or groundwater levels that could induce land stability changes.

9.10.2 The cumulative schemes to be considered are outlined in **Appendix A.8**.

9.10.3 The DMRB¹²⁹ provides a specific methodology for assessing the significance of cumulative impacts. This has been used as a guide for the purposes of this assessment by considering:

- Which receptors or resources are affected?
- How will the activity or activities affect the condition of the resource?
- What are the probabilities of such effects occurring?
- What ability does the receptor/resource have to absorb further effects before change becomes irreversible?

9.10.4 To enable consideration of a worst-case scenario, it is assumed that, where development consent for the Proposed Development has been granted or has been applied for, the other identified developments could be constructed at the same time as the Proposed Development or in the following months, thus giving rise to potential construction-related cumulative effects.

9.10.5 Of the cumulative schemes within the 250 m Zol, three¹³⁰ are located within 250 m of, and partially overlap the Proposed Development.

- Planning Inspectorate Reference EN010137 - Mona Offshore Wind Farm. Construction access, temporary construction compounds and 400 kV grid connection cables located within the BESS Site. EN010137 will be taken forwards to cumulative assessment.
- Planning Inspectorate Reference EN010112 - Awel y More Offshore Wind Farm. Work Nos. 36 (haul road, temporary construction laydown area, 2 x 400 kV cables), 39 and 39a (construction access and temporary construction compound) and 40 (substation connections) all fall within the boundary of the BESS Site. EN010112 will be taken forwards to cumulative assessment.
- CCBC Reference 0/40999 - Land immediately north of A547 Rhuddlan Road Towyn Conwy. The red line boundary of this solar development, consented by CCBC in 2015, overlaps with the Solar Site. As further building out of the adjacent consented solar scheme is understood not to be taking place, 0/40999 will not be taken forwards for cumulative assessment.

¹²⁹ National Highways (2019), Design Manual for Roads and Bridges. Available at: www.standardsforhighways.co.uk/dmr/, Accessed February 2025

¹³⁰ EN010137 – Mona Offshore Wind Farm, EN010112 - Awel y More Offshore Wind Farm, and 0/40999 - Land immediately north of A547 Rhuddlan Road Towyn Conwy



- 9.10.6 All other identified cumulative schemes are located outside of the 250 m Zol and are therefore not taken forwards for cumulative assessment.

Cumulative Schemes – Releases of Contamination to Groundwater

- 9.10.7 There is potential that existing contamination within the soils could be mobilised into the groundwater during the construction of the Proposed Development. This contamination could potentially migrate to the adjacent cumulative schemes.
- 9.10.8 The Phase 1 GCA (**Appendix E.1**) identified a very low risk to on-Site and off-Site human health associated with potential contamination originating within the BESS Site.
- 9.10.9 Construction of the Proposed Development will be undertaken in accordance with the embedded mitigation measures to minimise effects from contamination. It is assumed that the cumulative schemes within the Zol will similarly be governed by a CEMP or Code of Construction Practice and will apply best practice construction methods to minimise effects from contamination.
- 9.10.10 Based on the above, the likelihood of a release of contamination to groundwater during construction of the Proposed Development, which then subsequently migrates to an adjacent scheme, is considered highly unlikely. Similarly, the likelihood of a release of contamination to groundwater during construction of the adjacent or nearby cumulative scheme, which then subsequently migrates to the Site is considered highly unlikely.
- 9.10.11 The construction and operational and maintenance phase effects to hydrogeology receptors, in the absence of cumulative schemes have been assessed as **Negligible to Minor**. It is considered that the very low likelihood of a release of contamination and the incorporation of the mitigation measures described above means that the cumulative effects due to releases of contamination to groundwater are **Negligible to Minor, Not Significant and Temporary**.
- 9.10.12 Given the anticipated ground conditions and historical land uses, it is considered that a release of contamination at the Site to groundwater, if it occurred, is highly unlikely to be discernible at the cumulative schemes outside of the 250m Zol.

Cumulative Schemes – Releases of Contamination to Air

- 9.10.13 The primary effect of releases to air would be related to human health. Releases of contamination (if present) to the air would likely be discernible at the adjacent and nearby (within 250m) cumulative schemes. However, it would not be discernible over the distance to the next nearest of the identified cumulative schemes. The primary receptor for releases to air is human health.
- 9.10.14 The Phase 1 GCA (**Appendix E.1**) assessed the construction phase risk to off-Site human health from contamination originating within the BESS Site (in absence of any mitigation) as very low. With the introduction of an adjacent human health receptor (construction and maintenance workers working on or at the adjacent cumulative schemes) the assessed risk is increased to moderate.
- 9.10.15 Construction of the Proposed Development will be undertaken in accordance with the embedded mitigation measures described in the sections above to minimise impacts from contamination. It is assumed that the adjacent and nearby (within the 250 m Zol) cumulative schemes will similarly be governed by a CEMP or Code of Construction Practice and will apply best practice construction methods to minimise impacts from contamination.
- 9.10.16 Based on the above, the likelihood of a release of contamination to air during construction of the Proposed Development and the adjacent and nearby cumulative schemes is considered to be unlikely.



9.10.17 It is considered that the low likelihood of a release of contamination and the incorporation of the mitigation measures described above means that the cumulative impact due to releases of contamination to air are **Negligible** and **Not Significant**.

9.10.18 Given the anticipated ground conditions and historical land uses, it is considered that a release of contamination at the Site into the air is unlikely to be discernible at the cumulative schemes outside of the 250 m Zol.

Cumulative Schemes – Land Stability

9.10.19 It is anticipated that the BESS will be constructed on conventional shallow foundations . However, the possibility for use of piled foundations cannot be ruled out at this stage of the design process. Such forms of construction, in the absence of any significant excavation, are not anticipated to introduce land stability hazards to the adjacent cumulative schemes.

9.10.20 The proposed elements of the adjacent cumulative schemes the overlap / border the Proposed Development comprise construction compounds, construction access and new underground cables. Such land uses, in the absence of any significant excavation, are not anticipated to introduce land stability hazards.

9.10.21 Cumulative land stability effects are not anticipated to the remaining identified potential cumulative schemes outside of the 250 m Zol given the topography of the region and the nature of the cumulative schemes, i.e., none appear to involve significant excavation or reprofiling such as quarrying works.

9.10.22 Cumulative effects to land stability are therefore considered to be **Negligible** and **Not Significant**.

9.11 Monitoring

9.11.1 Significant residual adverse effects have not been identified therefore no additional long-term monitoring is proposed.

9.12 Consideration of Climate Change

9.12.1 LCRM¹¹² recommends the incorporation of climate change considerations into land contamination risk assessment and the options appraisal process with the aim that site works and any long-term remediation are sustainably robust and can endure future climate change events.

9.12.2 The EIA Regulations 2017¹³¹ introduced a requirement to consider the following:

- The vulnerability of the project to climate change. The following text discusses this in the context of ground conditions.
- The impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) – this is not included in this Chapter.

9.12.3 Climate change requires the design and implementation of land contamination risk management reduction measures to account for Extreme Weather Events (EWE). EWE considers not just the general increase in magnitude such as temperature but also the intensity such as increasingly intense precipitation causing run-off or short-term groundwater level rise of surface flooding.

9.12.4 Developments must account for actual or anticipated climate change and key to this is the evaluation, and management of uncertainties when considering the effects of climate change on contaminant sources, pathways, and receptors. Key requirements of ground conditions

¹³¹ HMSO (2017), The Town and Country Planning (Environmental Impact Assessment) Regulations 2017



management schemes are effectiveness and durability and ensuring that these elements remain serviceable throughout the timeframe required.

9.12.5 Examples of EWE and the potential effects during construction and operation are presented below:

Construction and Decommissioning

- Increased frequency of extreme weather. 1) Damage, delay, health and safety impacts, increased costs.
- Increased temperatures, prolonged periods of hot weather such as hotter, drier summers. e.g., warm and dry conditions exacerbate dust generation and dispersion, health risks to construction workers.
- Increased precipitation and intense periods of rainfall during warmer, wetter winters 1) Flooding of works and soil erosion. 2) Increased risk of contamination of waterbodies due to run-off. 3) Disruption to supply of materials and goods.

Operation

- Increased precipitation, especially in Winter. 1) Flooding. 2) Water scour causing structural damage. 3) Weakening or wash-out of structural soils. 4) Change in ground water level and soil moisture.
- Gales. 1) Damage from wind borne debris. 2) Additional or uneven loading of structures. 3) Disruption and potential danger to crossing users (including pedestrians and cyclists). 4) Damage to trees / landscaping.
- Temperature extremes / dry periods. 1) Stress on structures and technology. 2) Stress on surfaces e.g., difficulties with maintaining required texture depth during construction and operation. 3) Challenges for maintenance regimes. 4) Increased erosion/deterioration of unprotected natural surfaces.

9.12.6 Climate change is not anticipated to alter the sensitivity / vulnerability of the identified receptors as:

- The on-site and off-site human health receptors (already assessed as reasonable worst case) are unlikely to change
- Changes to long term groundwater levels and increased seasonal variations of groundwater levels are unlikely given the likely significant thickness of low permeability Diamicton that overlies the underlying aquifers.
- The viability of or demand for the identified minerals resources during the lifetime of the Proposed Development is unchanged, as a long-term land-bank is already provided by the resources in the existing quarries.

9.12.7 Consideration of the potential effects of climate change on Ground Conditions and Contaminated Land leading to impacts on the Proposed Development will be conducted during detailed design, and suitable design parameters adopted to account for any potential adverse impacts including slope angles and vegetation selection.

9.12.8 Climate change is not anticipated to alter the magnitude of the effects during the operational phase as the design of the Proposed Development (as built at the construction phase) will include mitigations for climate change effects.

9.12.9 Given that there are no anticipated changes in the sensitivity of receptors or the magnitude of effects, potential changes in significance as a result of climate change are not anticipated.



9.13 Conclusion

- 9.13.1 This chapter assesses the potential effects from the disturbance of existing contamination within the ground on human health and the environment during the proposed construction, operational, and decommissioning phases. This chapter also assesses the effects of potentially contaminated ground or groundwater and ground instability on the Proposed Development as well as the effects of construction of the Proposed Development upon mineral resources.
- 9.13.2 A Phase 1 GCA was undertaken (**Appendix E.1**) to identify the baseline conditions, including potential land contamination sources, instability hazards and sensitive receptors within the study area and a preliminary conceptual model was developed identifying where sources and receptors may interact through pathways (also known as a contaminant linkage).
- 9.13.3 The Phase 1 GCA found that sources of potential contamination were absent from the majority of the Site as the land use history was limited to agricultural use (noting that areas of existing road that were to remain as road following the construction of the Cable Corridor were excluded from the assessment). Off-Site activities with the potential to generate contamination included farms, a former landfill, St. George Quarry, a former small gas works, a waste bulking station, a skip yard / waste transfer station, a household waste recycling centre, fuel filling stations, a recycled plastic products factory and an historical lead mine.
- 9.13.4 The receptors considered within this chapter include on-Site and off-Site human health, hydrology, hydrogeology and safeguarded minerals resources.

Construction and Decommissioning Phase Effects

- 9.13.5 The embedded construction and decommissioning phase mitigation includes:
- Layout optimisation of the Proposed Development to avoid sensitive features / receptors, as far as is practicable and locate structures away from areas of potential land stability hazards.
 - The design will be informed by the results of intrusive ground investigations and assessment undertaken prior to construction.
 - Earthworks or materials movement (including any re-use of materials) and any temporary dewatering activities will be undertaken in accordance with permits/permissions secured within the suitable regulatory regimes.
 - Foundation Works Risk Assessment will be undertaken post-consent for any structures requiring deep foundations / piling. At trenchless crossings a Hydrogeological Risk Assessment (HRA) will be undertaken post-consent to assess the specific risks to surface water and groundwater receptors and identify any additional mitigation or remediation that may be required.
 - The ES is supported by an oCEMP and an oDEMP. These documents outline how the construction and decommissioning of the Proposed Development will avoid, minimise, or mitigate effects on the environment and surrounding area.
 - The construction and decommissioning of the Proposed Development will be undertaken in accordance with the Construction (Design and Management) Regulations 2015 (CDM) regulate the health, safety and welfare of construction projects and will apply to the Proposed Development. Occupational health and safety measures and statutory health and safety compliance will minimise the risks associated with potential contamination.
 - A protocol for managing any unexpected contamination will be developed by the Contractor.



- 9.13.6 With the inclusion of the above embedded mitigation measures, the likely significant effects to the identified receptors during the construction and decommissioning phases are either Negligible or Minor Adverse and Not Significant. In absence of any significant effects, additional Secondary mitigation is not proposed, and the assessed residual effects are the same as the preliminary effects.

Operational Phase Effects

- 9.13.7 Mitigation for the operational phase is not proposed. For Ground Conditions, the effects of the construction phase mitigation often continue to be realised at the construction phase, e.g., the removal of contaminated soils during construction means that human health receptors during the operational phase will not encounter contamination.
- 9.13.8 The likely significant effects to the identified receptors during the operational phase are either Negligible or Minor Adverse and Not Significant. In absence of any significant effects, additional Secondary mitigation is not proposed, and the assessed residual effects are the same as the preliminary effects.



10 Biodiversity

10.1 Introduction

10.1.0 This Chapter of the ES assesses the likely significant effects of the Proposed Development on biodiversity and features of nature conservation value. The Chapter considers the likely significant effects of construction, operation and decommissioning of the Proposed Development upon Important Ecological Features (IEFs) such as designated sites, important habitats and protected/notable species. The assessment is based on the characteristics of the Site and surrounding area, as well as the key parameters of the Proposed Development detailed in **Chapter 3 – Site and Development Description**.

10.1.1 This Chapter is supported by, and should be read in conjunction with the following Appendices:

- **Appendix F.1:** Ecological Baseline Report;
- **Appendix F.2:** Shadow Habitats Regulations Assessment Report (sHRA);
- **Appendix F.3:** Outline Ecological Construction Method Statement (oECMS);
- **Appendix F.4:** Outline Landscape Environmental Management Plan (oLEMP); and
- **Appendix F.5:** Biodiversity Figures.

10.1.2 This Chapter has been prepared by The Environmental Dimension Partnership Ltd (EDP). In accordance with Regulation 17(4)(b) of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix A.4**.

10.1.3 This Chapter has been prepared with reference to The Chartered Institute of Ecology and Environmental Management’s (CIEEM) Ecological Impact Assessment Guidelines (CIEEM, 2018 version 1.3 – updated September 2024).

10.2 Policy Context, Legislation, Guidance and Standards

10.2.1 This section identifies the legislation, planning policy and technical guidance that has informed the assessment of effects with respect to Biodiversity. Further information on policies relevant to the Project is provided in the Planning Statement submitted with the application.

Legislation

10.2.2 A summary of the relevant legislation is given in **Table 10.1**.

Table 10.1: Legislation relevant to the Biodiversity assessment

Legislation	Legislative Context
The Environment (Wales) Act 2016 ¹³²	This act makes provisions within Wales for the planning and managing of natural resources at national and local level. Section 6 introduces the biodiversity and resilience of ecosystems duty whereby public authorities are required to seek to maintain and enhance biodiversity so far as it is consistent with the proper exercise of those functions. Section 7 introduces a list of living organisms and types of habitat which are, in the opinion of the

¹³² UK Government (2016). The Environment (Wales) Act 2016. (Online). Available at: <https://www.legislation.gov.uk/anaw/2016/3/contents/enacted> [Accessed April 2025].



Legislation	Legislative Context
	Welsh Ministers, of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales.
The Wildlife and Countryside Act 1981 (as amended) (WCA) ¹³³	This act consolidates and amends existing national legislation to implement the Bern Convention ¹³⁴ . This piece of legislation remains the primary UK mechanism for statutory site designations (e.g., Sites of Special Scientific Interest (SSSI)) and the protection of individual species listed under Schedules 5 and 8 of the WCA, each subject to varying levels of protection.
Protection of Badgers Act 1992 ¹³⁵	The Protection of Badgers Act provides protection to badgers and their places of shelter (setts).
The Conservation of Habitats and Species Regulations 2017 (as amended) ¹³⁶	The Habitats Regulations transpose the Habitats Directive ¹³⁷ into English and Welsh law. The Habitats Regulations provide for the designation and protection of European sites, the protection of certain species (referred to as European Protected Species or EPS) and the adaptation of planning and other controls for the protection of European sites.
The Hedgerows Regulations 1997 ¹³⁸	The Hedgerows Regulations are intended to protect important countryside hedges from damage or destruction.

Planning Policy

10.2.3 A summary of the relevant national and local planning policy is given in **Table 10.2**.

Table 10.2: Planning policy relevant to the Biodiversity assessment

Policy	Policy Context
National planning policy	
Future Wales: The National Plan 2040 ¹³⁹	The Welsh national development framework sets the direction for development in Wales to 2040. Policy 9 – Resilient Ecological Networks and Green Infrastructure outlines measures to ensure the enhancement of biodiversity, the resilience of ecosystems and the provision of green infrastructure.
Planning Policy Wales (PPW) Edition 12, February 2024 - Chapter 6 Distinctive and Natural Places (12th Ed.; 2024) ¹⁴⁰	Chapter 6 of Planning Policy Wales 12 (PPW) sets out the Welsh Government's objectives for Distinctive and Natural Places. Planning policy topics cover the historic environment, landscape, biodiversity and habitats, coastal characteristics, air quality, soundscape, water services, flooding and other environmental (surface and sub-surface) risks. This latest revision focuses on green infrastructure; net benefit for biodiversity and the step-wise approach; SSSIs; and trees and woodland.
PPW supplementary Technical Advice Note 5 (TAN5) Nature	Technical Advice Note 5 (TAN5) supplements Planning Policy Wales (PPW) and sets out statutory, protection-specific policies in relation to the protection of biodiversity and geological

¹³³ UK Government (1981). The Wildlife and Countryside Act 1981 (as amended). (Online) Available at: <https://www.legislation.gov.uk/ukpga/1981/69/contents> [Accessed April 2025].

¹³⁴ The Convention on the Conservation of European Wildlife and Natural Habitats, 1982. Available at: <https://www.coe.int/en/web/conventions/full-list?module=treaty-detail&treaty-num=104> [Accessed April 2025].

¹³⁵ UK Government (1992). Protection of Badgers Act 1992. (Online) Available at: <https://www.legislation.gov.uk/ukpga/1992/51/contents> [Accessed April 2025].

¹³⁶ UK Government (2017). Conservation of Habitats and Species Regulations 2017 ("the Habitats Regulations") has been amended by (inter alia) the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Online).

¹³⁷ Council Directive 92/43/EEC on the Conservation of natural habitats and wild flora and fauna, May 1992.

¹³⁸ UK Government (1997). The Hedgerows Regulations 1997 (Online). Available at: <https://www.legislation.gov.uk/uksi/1997/1160/contents/made> [Accessed April 2025].

¹³⁹ Welsh Government (2021). Future Wales: The National Plan 2040. (Online). Available at: <https://gov.wales/future-wales-national-plan-2040> [Accessed April 2025].

¹⁴⁰ Welsh Government (2024) Planning Policy Wales, Edition 12, February 2024. (Online). Available at: https://www.gov.wales/sites/default/files/publications/2024-02/planning-policy-wales-edition-12_1.pdf [Accessed April 2025].



Policy	Policy Context
Conservation and Planning (2009) ¹⁴¹	conservation through the planning system. Such policies include those receiving statutory protection under existing legislative provisions (as well as those sites, habitats and species out with such protection) and aim to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered.
Local planning policy	
Conwy County Borough Council (CCBC) Local Development Plan (LDP) up to 2022 (adopted October 2013)	CCBC LDP sets out policy NTE/3 relating to biodiversity, which sets out measures to conserve and, where possible, enhance biodiversity through: a. Sensitive siting; avoiding European protected sites or those of national or local importance; b. Sensitive layout and design which avoids impacts or mitigates through an agreed programme for any identified adverse impact on biodiversity; c. Creating, enhancing and managing wildlife habitats and natural landscapes including connectivity; d. Integrating biodiversity measures into the built environment; e. Providing for a management agreement with the Local Planning Authority to secure the retention and long-term future of biodiversity interests where applicable. Policy NTE/3 also details that when considering development proposals, it is important to first afford priority to the maintenance and enhancement of existing habitats and species.
Denbighshire County Council (DCC) Local Development Plan (LDP) up to 2021 (adopted June 2013)	The BGCBC LDP includes a number of policies relating to biodiversity. Policy RD 1 - Sustainable Development and Good Standard Design, includes criteria (iii) which states development proposals must protect and where possible enhance the local natural and historic environment. Policy VOE 1 - Key Areas of Importance, states that Statutory designated sites for nature conservation; and Local areas designated or identified because of their natural landscape or biodiversity value will be protected from development that would adversely affect them. That development proposals should maintain and, wherever possible, enhance these areas for their characteristics, local distinctiveness, and value to local communities in Denbighshire Policy VOE 10 - Renewable Energy Technologies, states that development proposals which promote the provision of renewable energy technologies may be supported providing they demonstrate no unacceptable impact upon the interests of nature conservation and wildlife.

Technical Guidance

10.2.4 A summary of the technical guidance for Biodiversity is given in **Table 10.3**, this guidance was used to define the survey methods employed to inform this assessment.

¹⁴¹ Welsh Government, (2009). Planning Policy Wales Technical Advice Note 5: Nature Conservation and Planning. (Online) Available at: <https://gov.wales/technical-advice-note-tan-5-nature-conservation-and-planning> [Accessed April 2025]



Table 10.3: Technical guidance relevant to the Biodiversity assessment

Technical Area	Technical Guidance Document
EclA	CIEEM (2022) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (version 1.3 updated September 2024).
Habitat Survey	Joint Nature Conservation Committee (2010) Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit; JNCC, Peterborough.
Priority Habitats	Jones PS, Stevens DP, Blackstock TH, Burrows CR, Howe EA. 2003. Priority Habitats of Wales – a Technical Guide. Bangor: Countryside Council for Wales.
Hedgerows	DEFRA (February 2024) Statutory Biodiversity Metric User Guide. Last updated: 3 July 2025. UKHab Ltd (July 2023) UK Habitat Classification Version 2.0 [https://www.ukhab.org]. DEFRA (February 2024) Statutory Biodiversity Metric Technical Annex 1: Condition Assessments.
Bird survey	Marchant, J.H., (1983)., Common Birds Census instructions. British Trust for Ornithology, Tring. Atkinson, P.W., Fuller, R.A., Gillings, S. & Vickery, J.A. (2006). Counting birds on farmland habitats in winter. Bird Study, 53:3, 303-309. Wilson, J.D., Taylor, R. & Muirhead, L.B. (1996) Field use by farmland birds in winter: an analysis of field type preferences using re-sampling methods. Bird Study, 43, 320–332.
Bat Survey	Collins (ed.) (2023). Bat surveys for professional ecologists: Good practice guidelines. 4th Edition. Bat Conservation Trust, London.
Badger Survey	Harris S, Cresswell P and Jefferies D (1989). Surveying Badgers. Mammal Society.
Otter Survey	Chanin P (2003). Monitoring the Otter <i>Lutra lutra</i> . Conserving Natura 2000 Rivers Monitoring Series No. 10, English Nature, Peterborough.
Water Vole Survey	Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) The Water Vole Mitigation Handbook (Mammal Society Mitigation Guidance Series) Mammal Society, London.
Great Crested Newt (GCN) Survey	Langton T, Beckett C and Foster J (2001). Great Crested Newt Conservation Handbook. Froglife, Suffolk. English Nature (2001). Great Crested Newt Mitigation Guidelines. English Nature, Peterborough. Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (<i>Triturus cristatus</i>) environmental DNA. Freshwater Habitats Trust, Oxford.

10.3 Consultation

- 10.3.1 The assessment has been informed by consultation responses and ongoing stakeholder engagement. **Table 1.2** within **Chapter 2** includes Natural Resources Wales (NRW) consultation response to the Scoping Opinion, which has been fully addressed within this Chapter. PEDW, DCC and CCBC echoed the comments provided by NRW.

10.4 Methodology

- 10.4.1 All survey methodologies used within the assessment followed published guidelines current at the time of the survey and accepted by statutory and non-statutory agencies, including NRW



and CIEEM. This EclA follows the standard current guidance in place at the time of writing, as set out by the CIEEM and recommended by NRW.

- 10.4.2 The scope of the EclA has been determined by current ecological investigations of the Site and in respect of the Scoping Direction from PEDW and consultation responses received from NRW, DCC and CCBC.

Study Area

- 10.4.3 Baseline data has been collected within the potential zones of influence (Zol) of the Proposed Development, which varies according to the feature in question. The following are considered sufficient to cover the potential Zol of the Proposed Development in relation to designated sites, habitats and species:

- International statutory designations (15 km radius around the boundary of the Site);
- National statutory designations and non-statutory local sites (2 km radius around the boundary of the Site); and
- All other protected, priority and notable species (2 km radius around the boundary of the Site).

Baseline Data Collection

- 10.4.4 An overview of the survey methodologies for Biodiversity is given in **Table 10.4**.

Table 10.4: Overview of Ecological Surveys

Survey	Methodologies
Desk Study	Desk study records search during July 2024, the main data sources being: Multi-Agency Geographic Information for the Countryside (MAGIC); and, North Wales Environmental Information Service (Cofnod).
Extended Phase 1 Habitat Survey	The main habitats within the Site, together with their dominant/ characteristic plant species, were identified by undertaking an Extended Phase 1 Habitat survey. The Solar Site and BESS Site were covered in July 2024, and the Cable Corridor (western half) in October 2024.
Hedgerow Survey	Hedgerows within the Site were surveyed in October 2024 following the guidance for habitat surveys as set out in The Statutory Biodiversity Metric User Guide, for which the habitat definitions primarily rely on descriptions set out in the UK Habitat Classification and habitat conditions as set out for the Statutory Biodiversity Metric.
Breeding Bird Survey	Breeding bird surveys were undertaken across April to July 2025 following a pilot survey in July 2024 with reference to standard methodology, entailing a modified Common Bird Census (CBC) 'territory mapping' approach.
Wintering Bird Survey	A wintering farmland bird survey was undertaken across November 2024 to February 2025 to identify whether any notable species populations occur during the winter and migratory months.
Bat Surveys	Ground Level Tree Assessment (GLTA) of trees was undertaken in April 2025 to record any external evidence of roosting bats or any features capable of supporting roosting bats that can be seen from the ground, completed with reference to good practice guidelines (Collins, J., 2023).
	Nighttime Bat Walkover (NBW) surveys were completed in August 2024, October 2024 and April 2025 with reference to good practice guidelines (Collins, J., 2023).
	Automated Detector surveys were completed monthly from July to October 2024 and April to June 2025 with reference to good practice guidelines (Collins, J., 2023).



Otter Survey	All waterbodies were surveyed for evidence of otter, including holts, spraints, feeding remains and footprints in September 2024 and again in May/June 2025.
Water Vole Survey	All waterbodies were surveyed for evidence of water voles, including burrows, latrines, feeding remains and footprints in September 2024 and again in May/June 2025.
Badger Survey	Survey was undertaken in October 2024 to search for evidence of badger within the Site. During the survey, any signs of badger activity such as setts, holes, latrines, trails, snuffle holes and hairs on fencing or vegetation were recorded.
Great Crested Newt Survey	All ponds on Site and (where access allowed) within 250m of the Solar and BESS Sites and within 50m of the Cable Corridor were subject to an eDNA survey in April/May 2025. Those ponds testing positive were then subject to a population survey in May to June 2025.

Limitations

- 10.4.5 The baseline surveys that were carried out at the Site followed current standard industry guidance and therefore provide a robust basis for the identification of IEFs. However, no survey can provide absolute confidence about the presence or absence of species at a site, or a completely accurate knowledge about the distribution of species across a site.
- 10.4.6 The assessment is based on baseline survey results that are accurate at the time of survey. However, the baseline can change due to the mobility of some species, changes in land management and natural processes of vegetation succession. As all pertinent habitat and species surveys have been completed within 18 months prior to application, it is considered that the baseline data is up to date for the purpose of conducting a thorough assessment.
- 10.4.7 No significant limitations were encountered during the course of the survey work. However, a number of minor limitations, mostly relating to presence of cattle within the Solar Site for a few of the survey visits, flooded fields preventing access during one bat survey and limited access to off-site ponds for the GCN surveys, were encountered. Full details of these and any assumptions made are discussed in detail within **Appendix F.1**.

Assessment

- 10.4.8 An evaluation of IEFs has been made with reference to CIEEM's Ecological Impact Assessment Guidelines¹⁴² (hereafter referred to as 'the Guidelines'), a summary of which is provided in the following paragraphs. The Guidelines advocate an approach to valuing features that involves professional judgement based on available guidance and information, together with advice from experts who know the locality of the Proposed Development and/or the distribution and status of the species or features that are being considered.
- 10.4.9 The Guidelines recommend that the value, or potential value, of an ecological resource or feature should be determined within a defined geographical context.
- 10.4.10 The Guidelines also state that:
- 10.4.11 *"Various approaches can be adopted for defining local importance, including assessment within a district, borough or parish context or within other locally defined areas. Consideration of impacts at all scales is important, and essential if objectives for no net loss of biodiversity and maintenance of healthy ecosystems are to be achieved."*
- 10.4.12 For the purposes of this assessment, the following adapted geographic frame of reference has therefore been used:

¹⁴² CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Chartered Institute of Ecology and Environmental Management, Winchester.



Environmental Statement

- International;
- National (Wales);
- Regional (North Wales);
- County (Conwy and Denbighshire); and
- Local (Bodelwyddan) and
- Site level.

10.4.13 Any feature or effect of less than Site level importance is considered to be Negligible.

Valuing Designated Sites

10.4.14 Within the UK, certain valued habitats have been assigned a level of nature conservation value through designation and the Guidelines recommend that the reasons for this designation need to be considered in the assessment. Such designations include:

- Internationally important sites such as Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites;
- Nationally important sites such as Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs); and
- Regional / County important sites, such as Local Nature Reserves (LNRs) and local sites which within Conwy and Denbighshire are referred to as Wildlife Sites.

10.4.15 Where a feature has value at more than one designation level, its overriding value is that of the highest level.

Valuing Habitats

10.4.16 The Guidelines recommend that the value of areas of habitat and plant communities should be measured against published selection criteria where available, such as those listed on Annex I of the Conservation of Habitats and Species Regulations 2017 (as amended), or those listed as habitats of principal importance under Section 7 of the Environment (Wales) Act 2016. Where areas of a habitat or plant communities do not meet the necessary criteria for designation at a specific level, the Guidelines recommend that the ecologist may consider the local context if appropriate. Additionally, consideration should also be given to the potential value of those habitats, particularly where habitats are in a degraded or unfavourable condition at the time of the assessment.

Valuing Species

10.4.17 The Guidelines require consideration of all protected species as 'important' features where there is the potential for a breach in legislation. Additionally, species should be assessed according to their biodiversity value, measured against published selection criteria where available (such as those listed in Annex II of the Conservation of Habitats and Species Regulations 2017 (as amended) and those listed as species of principal importance under Section 7 of the Environment (Wales) Act).

10.4.18 In assigning value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records, as well as their legal protection. The valuation of populations should make use of any relevant published evaluation criteria available at the time of assessment.

Reporting of the Environmental Effect and Significance Criteria



10.4.19 The assessment of likely significant environmental effects as a result of the Proposed Development has taken into account the construction, operational and decommissioning stages. The following sections define the approach adopted within the assessment for the determination of potential impacts and the level of significance.

Assessment of Potential Impacts

10.4.20 The assessment of the potential impacts of the Proposed Development considers both on-site impacts and those that may occur at adjacent and more distant ecological features. Impacts can be positive or negative. Negative impacts can include:

- Direct loss of wildlife habitats;
- Degradation, fragmentation and isolation of habitats;
- Disturbance to species from noise, light, or other visual stimuli;
- Changes to key habitat features; and/or
- Changes to the local hydrology, water quality and/or air quality.

10.4.21 Direct, indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, negative and positive impacts on nature conservation features have been characterised based on predicted changes as a result of the proposed activities.

10.4.22 In order to characterise the impacts on each feature, the following parameters are considered:

- The magnitude of the impact (i.e., the size, amount, intensity or volume. Magnitude is quantified where possible and provided in absolute or relative terms);
- The extent over which the impact would occur (i.e., the spatial or geographical area over which the impact may occur during a representative range of conditions);
- The temporal duration of the impact (which is defined in relation to ecological characteristics such as the lifecycle of a species as well as human timeframes);
- Whether the impact is reversible and over what timeframe (an effect is considered reversible if it can be counteracted by mitigation or if spontaneous recovery is possible); and
- The timing and frequency of the impact (timing may change the result of an impact if it coincides with sensitive life-stages or seasons, and the number of times an activity occurs will influence the resulting effect).

Criteria for Assessment

10.4.23 The assessment identifies those positive and negative impacts which would be 'significant', based on effects that either support or undermine the conservation objectives of the ecological feature or biodiversity in general. Significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent abundance and distribution). Such significant effects are qualified with reference to an appropriate geographic scale and based on the best available scientific evidence. Where it is not possible to robustly justify that no significant effect will occur, a significant effect is assumed.

10.4.24 The integrity of 'designated' sites is described as follows and is taken from the Guidelines. It has been used in this assessment to determine whether the impacts of the proposals on a designated site are likely to be significant:



10.4.25 *“Significant effects encompass impacts on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species.... The following need to be determined: For designated sites - is the project and associated activities likely to undermine the conservation objectives of the site, or positively or negatively affect the conservation status of species or habitats for which the site is designated, or may it have positive or negative effects on the condition of the site or its interest/qualifying features?”*

10.4.26 The conservation status of habitats and species within a defined geographical area is described as follows (CIEEM, 2018), and has been used in this Chapter to determine whether the impacts of the proposals on non-designated habitats and species are likely to be significant:

10.4.27 *“Habitats - conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area;*

10.4.28 *Species - conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.”*

10.4.29 On the basis of the above, and within this assessment, ecological effects are described as:

- Significant or not significant;
- Direct and/or indirect;
- Permanent or temporary; and
- Negative or positive.

10.4.30 Mitigation measures have been incorporated into the assessment plans and considered during the assessment of effects, so that the residual impact assessment reflects the completed development. These measures include those required to achieve the minimum standard of established practice plus additional measures to further reduce the effects of the Proposed Development. The assessment considers the likely success of the mitigation.

Determining Significance

10.4.31 Impacts are unlikely to be significant where features of local importance or sensitivity are subject to small-scale or short-term impacts. However, where there are a number of small-scale impacts that are not significant alone, it may be that, cumulatively, they might result in an overall significant impact.

10.4.32 Although certain species and habitats may not constitute IEFs based upon their nature conservation value, they may still warrant consideration during the design of the Proposed Development (and any mitigation identified) based on their legal protection, their implications for policies and plans, or other issues, such as animal welfare.

10.4.33 The significance of the potential impacts upon IEFs has been assessed both before and after consideration of additional mitigation measures. The latter represents the assessment of the residual impacts of the Proposed Development.

10.5 Baseline Conditions

The Site & Surrounding Area

10.5.1 This section summarises the baseline ecological conditions within the Site and the surrounding area, determined through the course of desk-based investigations and field-based investigations described above. In particular, this section identifies and evaluates those ecological features/receptors which lie within the potential Zol of the Site, and which are



pertinent in the context of the Proposed Development. Full results of the surveys undertaken are provided within **Appendix F.1**.

Statutory Designated Sites

- 10.5.2 The Site is not covered by any statutory designations for nature conservation. However, eight international statutory designations (including the Dee Estuary, which is covered by three different designations) are located within 15 km of the Site, as shown on **Figure 10.3**. Those designations scoped into the assessment, as confirmed through the Scoping Direction, are summarised within **Table 10.5**. These sites are considered to be of International ecological importance.
- 10.5.3 Other than Coedydd ac Ogofau Elwy a Meirchion SSSI, which is a component of Elwy Valley Woods SAC, there are no other national statutory designations within 2 km of the Site, such that impacts on other national statutory designations have been scoped out. This SSSI is considered to be of National ecological importance. Kinmel Dunes Local Nature Reserve (LNR) is a statutory designation of County ecological importance within 2 km of the Site, however, this has been scoped out of the assessment, as confirmed through the Scoping Direction, due to lack of any potential impacts.

Table 10.5: Statutory Designations within the Zol of the Site

Designation Name	Distance from Site (Direction)	Reasons for Designation
Elwy Valley Woods SAC	1.4 km (S)	One of three sites selected to represent <i>Tilio-Acerion</i> forest across its geographic range on the Carboniferous limestone of north Wales.
Coedydd ac Ogofau Elwy a Meirchion SSSI	1.4 km (S)	A component of Elwy Valley Woods SAC. Designated for the woodland species and habitats it supports. Additionally, bat roosts have been recorded in the caves.
The Dee Estuary SAC, SPA and Ramsar Site	10.1 km (E)	10.5.4 <u>SAC primary habitats</u>: Mudflats and sandflats not covered by seawater at low tide; <i>Salicornia</i> and other annuals colonizing mud and sand; Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>). 10.5.5 <u>SPA features</u>: Over wintering species: bar-tailed godwit (<i>Limosa lapponica</i>), black-tailed godwit (<i>Limosa limosa islandica</i>), curlew (<i>Numenius arquata</i>), dunlin (<i>Calidris alpina alpina</i>), grey plover (<i>Pluvialis squatarola</i>), knot (<i>Calidris canutus</i>), oystercatcher (<i>Haematopus ostralegus</i>), pintail (<i>Anas acuta</i>), redshank (<i>Tringa totanus</i>), shelduck (<i>Tadorna tadorna</i>) and teal (<i>Anas crecca</i>). The Site also supports breeding common tern (<i>Sterna hirundo</i>) and little tern (<i>Sterna albifrons</i>), as well as supporting on passage sandwich tern (<i>Sterna sandvicensis</i>) and redshank (<i>Tringa totanus</i>). The SPA also regularly supports at least 20,000 waterfowl. <u>Ramsar Site features</u>: One of the top ten estuaries in the UK for wintering and passage waterfowl populations. The estuary supports internationally important numbers of waterfowl and waders.

Non-Statutory Designated Sites

- 10.5.6 There are 31 Wildlife Sites present within 2 km of the Solar Site including two within the Site, and there are 11 Wildlife Sites within 2 km of the BESS Site. Locations of these non-statutory designations are illustrated on **Figure 10.4**. With respect to those scoped into the assessment through the Scoping Direction, the Abergele Grazing Marsh Wildlife Site (Candidate) and Morfa Rhuddlan Wildlife Site (Candidate), both of which are designated for grazing marsh,



overlap the northern section of the Solar Site. Furthermore, the proposed Cable Corridor linking the Solar Site to the BESS Site also passes through Coed Parc Kinmel (Candidate) Wildlife Site, designated for its coniferous woodland. These Wildlife Sites are considered to be of County ecological importance.

Habitats

- 10.5.7 In summary, the majority of the Solar Site and BESS Site comprise agricultural fields dominated by improved grassland subject to grazing and/or cropped for silage (both of which are of limited inherent ecological value) or arable land. The Solar Site and BESS Site are delineated by a network of managed native hedgerows and dry and wet ditches. Other habitats present include standing water (pond), mature trees and patches of dense and scattered scrub. The Cable Corridor runs through a number of woodlands (including parcels of semi-natural mixed woodland, plantation mixed woodland and recently felled woodland), utilising existing bare ground trackways in order to avoid impacts on mature trees. Additionally, a number of woodlands are immediately adjacent to and overhang the Solar Site.
- 10.5.8 Based on mapping data received from Cofnod, the following habitats of principal importance, as listed within Section 7 of the Environment (Wales) Act 2016 (also referred to as 'priority habitats'), are present within or near to the Site:
- Coastal floodplain and grazing marsh - covers a large proportion of the Solar Site; and
 - Wood-pasture and parkland - present along parts of the proposed Cable Corridor, within Kinmel Park and Bodelwyddan Park.
- 10.5.9 In relation to irreplaceable habitats, there are several parcels of ancient woodland in the vicinity of the Site, however, none within the Site and thus none engaged by the Proposed Development. The closest area of ancient woodland is a strip of Restored Ancient Woodland, which is adjacent to the southern boundary of the Solar Site.
- 10.5.10 Those on-site habitats of sufficient value for inclusion as IEFs in the assessment are summarised in **Table 10.6**. The distribution of habitats within the Site is illustrated on **Figure 10.1** and **Figure 10.2** and further details/evaluation of these habitats are provided in **Appendix F.1**.

Table 10.6: Important Habitats

IEF	Summary	Level of Ecological Importance
Priority habitat: Coastal floodplain and grazing marsh	Covers the northern section of the Solar Site.	County
Priority habitat: Wood-pasture and parkland	Present along parts of the proposed Cable Corridor, within Kinmel Park and Bodelwyddan Park	County
Ancient woodland	Restored ancient woodland sites are located immediately adjacent to the Solar Site and parts of the Cable Corridor. Areas of plantation on ancient woodland are also located immediately adjacent along parts of the Cable Corridor.	County
Priority habitat: native hedgerows and mature trees	Hedgerows H1.1 – H1.6, H2.1 – H2.4, H3.1 – H3.8, H4.1 – H4.3, H5.1 - H5.27 across the Site.	Local
Wet ditches	Ditches 1.1 – 1.3, 2.1 – 2.2, 3.1 – 3.13, 4.1, 5.1 - .5.23 across the Solar Site.	Local
Priority habitat: pond (standing water)	Single pond P1 within the Solar Site.	Local



Species

10.5.11 A detailed account of the protected and notable species present within and around the Site is provided in **Appendix F.1**, including justification for the geographic scale at which they have been valued. Those species, or species assemblages, of sufficient value for inclusion as IEFs in the assessment are summarised in **Table 10.7** below.

Table 10.7: Important Species

IEF	Summary	Level of Ecological Importance
Breeding birds	Relatively diverse breeding assemblage including 26 species of conservation concern, possibly breeding on-site in small numbers, except skylark (9-15 pairs). Also of note were lapwing (2-3 pairs), teal (2-4 pairs), meadow pipit (2-3 pairs), reed bunting (1-3 pairs), wheatear (2-3 pairs) and linnet (3-6 pairs).	Local
Wintering birds	Diverse assemblage including some larger flocks of wetland waterfowl, waders and gull, albeit not on all visits. Most notably this included a large population of teal and smaller populations of jack snipe and snipe associated with the wet ditches on and adjacent to the Site. As a precaution, the teal population is considered potentially functionally linked to the Dee Estuary SPA/Ramsar site with >1% of the SPA population recorded on four of the six surveys. However, it should also be noted that teal are abundant in north-east Wales over winter.	County to International
Bats (roosting)	24 trees with Potential Roosting Features (PRFs) seen from the ground were identified within the Site. 17 of the trees supported PRFs that were estimated from the ground as suitable for individual bats (PRF-I) and seven trees supported PRFs that were estimated as being suitable for multiple bats (PRF-M).	Local
Bats (foraging and commuting)	At least ten bat species/species groups (Myotis and long-eared bat species were not identified to species level), were confirmed to be present foraging and/or commuting within the Site during the automated detector surveys. Soprano and common pipistrelle were the dominant species during the surveys, with recordings of Myotis sp. and noctule also made and rarer recordings of Plecotus sp., Nyctalus sp., lesser horseshoe, Nathusius' pipistrelle and serotine.	Local
Badger	No confirmed badger setts have been recorded within or around the Site, however some evidence of badger presence has been recorded suggesting foraging or dispersal within the Site.	Site
Otter	Several past records in the area north of the Solar Site, one record of otter spraints beside the ditch on the northern boundary of the Solar Site and two potential otter prints recorded on-Site during one of the surveys. With known presence in wider area, occasional use of the Solar Site for foraging/dispersal is assumed.	Local
Water vole	Numerous records in the area north of the Solar Site; and evidence of water vole recorded in several ditches within the Solar Site, mainly in the south-east.	Local
Great crested newt	The eDNA surveys returned positive results for three off site ponds, P6, P17 and P18, within 250m of the Site. The onsite pond P1, returned a negative eDNA result. The desk study returned records for great crested newts recorded within P1 in 2009.	Local



IEF	Summary	Level of Ecological Importance
Reptiles	Field margins and ditches provide potentially suitable habitat for common reptile species. Presence of these species assumed on precautionary basis.	Local

Baseline Evolution

10.5.12 It is anticipated, in the absence of the Proposed Development, that the existing habitats within and around the Site will continue to be intensively managed for agriculture as they currently are, with no evidence of management specifically for biodiversity or nature conservation. It is therefore likely that, in the absence of the Proposed Development, the condition of the habitats currently present and their suitability to support protected and priority species would slowly deteriorate.

10.5.13 Although climate modelling has been undertaken, it is not possible with any confidence to fully predict the effects on the baseline habitats and species from climate change. It is not considered that the species or habitats identified within the Site would be significantly affected by, or vulnerable to, the change in rainfall or temperature changes from climate change as modelled.

10.5.14 Climate induced changes could result in certain floristic species becoming more dominant/prevalent, with potential changes to their phenology or with certain species extending their home ranges. However, given that valued habitats and species are generally widespread, with the Site not at or near the edge of any of their ranges, the projected change in temperatures is not anticipated to result in any significant changes to designated site, habitat or species IEFs.

10.6 Primary and Tertiary Mitigation

10.6.1 During the design evolution for the Proposed Development, the initial findings of the ecology work were carefully considered and the mitigation hierarchy of 'avoid, mitigate and compensate' was used to minimise impacts. Primary mitigation and tertiary mitigation that has informed the assessment of effects, in the absence of any secondary mitigation, is detailed in the following sections.

Construction

10.6.2 Primary mitigation has been an integral part of the development of the layout for the Proposed Development, influenced by the ecological features within and surrounding the Site, as shown on the Proposed Solar Layout (Ref.02) and Proposed BESS Layout (Ref.03) drawings (**Appendix A.9**). This is shown illustratively within the Illustrative Landscape and Ecology Strategy (**Appendix G.1**). The following primary and tertiary mitigation which has been evaluated as part of the construction stage assessment is outlined below.

Primary Mitigation

- The retention and buffering of habitats of value within and adjacent to the Site including the vast majority of hedgerows (with 5 m buffer), wet and dry ditches (5 m buffer), main running water ditch along northern boundary of the Solar Site (named Bodoryn Cut, 10 m buffer), ancient woodland (15 m buffer), other woodland (10 m buffer), mature trees (10 m buffer) and the onsite and immediately off-site ponds (30 m buffer);
- Existing field access points will be used for construction activities and as the Proposed Development's maintenance access points (with the exception of the creation of one new access to the northern part of the Solar Site required from a highways safety perspective), reducing impacts on habitats of value such as hedgerows and ditches; and



- The provision of suitable buffers (5 m from top of bank) from retained ditches supporting water vole populations within the Site.

Tertiary Mitigation

- The retention of non-statutory designations, habitats and species interests, protected from construction impacts through the delivery of measures set out in a CEMP and ECMS, to be secured by planning condition. To inform these documents, an oCEMP and outline ECMS (oECMS) have been submitted with the application as **Appendix A.5** and **Appendix F.3** respectively. In general, the CEMP and ECMS will include mechanisms to deliver the sensitive siting of work compound(s) and storage areas, including the storage of any fuel, chemicals, plant or machinery, sensitive clearance of vegetation, prevention of pollution events, construction hours and the use of artificial lighting (including security lighting). A timetable of all key tasks to be undertaken as part of pre-construction and construction work will also be provided, taking into account all species and habitat sensitivities. The following additional measures are proposed for inclusion:
 - It is proposed that the methodologies prescribed within the ECMS will be overseen by an appointed Ecological Clerk of Works (ECoW), whose scope and remit will be set out within the ECMS. Detailed measures to protect habitats and species during the construction stage will be set out, as outlined below (excluding habitat creation which will be provided a part of the Landscape Environmental Management Plan (LEMP)). The ECMS will cross reference the Arboricultural Method Statement (AMS);
 - The ECMS would contain measures to fully protect the retained important habitats within and adjacent to the Site, which include hedgerows, ponds, ditches, mature trees and woodlands during construction activities. Measures would include the establishment of Ecological Protection Zones (EPZs), which could be integrated with any tree protection measures set out in the AMS;
 - All necessary surveys are considered to be sufficiently up-to-date at the time of submission to determine the application. However, where relevant and depending on development timescales and phasing, certain detailed species surveys (such as for badger, water vole and roosting bats) may require updating prior to commencement of the relevant phase of development and to apply for protected species licences prior to works if update surveys find a requirement for licensing;
 - As a general measure aimed at protecting species, 'toolbox talks' will be provided by a suitably qualified ecologist to the principal contractor appointed by the Applicant, for distribution to all employees involved in any enabling works/vegetation clearance and installing EPZs. This will confirm that identification and protection of the relevant species and their habitats is understood;
 - Retained nesting bird habitats such as trees, scrub and hedgerows will be included within EPZs, and the required removal of potential nesting habitat will be undertaken outside the bird breeding season (namely March-August inclusive). Should vegetation clearance be required during the breeding bird season, pre-commencement checks for active nests undertaken by the ECoW will be required prior to any suitable vegetation clearance, with appropriate buffers marked out around active nests or nests under construction, until all eggs have hatched and chicks fledged;
 - Ground nesting birds such as skylark - prior to the construction of each phase, clearance of former arable or grassland habitats should be undertaken between the months of September and February inclusive, to avoid nest destruction/disturbance during the skylark breeding season. Where this is not possible, a pre-commencement check for active bird nests will be undertaken by a suitably qualified ECoW immediately prior to the commencement of works, with appropriate buffers marked out around active nests or nests under construction, until all eggs have hatched and chicks fledged;



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- Overwintering teal - mitigation in the form of sensitive timing and methodologies of works located within the teal disturbance zone around the wet ditches will be detailed within the ECMS;
- Bats - retained trees with bat roost potential will be included within EPZs. Restricted working hours and use of lighting to minimise disturbance to foraging and commuting habitats will be employed. No trees are anticipated to require removal, however, should this change, update surveys will be undertaken to confirm the up-to-date roost status of the tree, followed by precautionary pruning or 'soft felling' of trees with roosting potential under the supervision of an appropriately qualified ecologist (under licence if required);
- Badger - given the mobile nature of this species and their presence on-site, an update survey by a suitably experienced ecologist is to be undertaken prior to the commencement of construction/clearance activities. Furthermore, any trenches will be covered overnight or, if left open, have a means of escape for any animals which might fall in;
- Water vole - retained ditches will be included within EPZs. Given the mobile nature of these species, a pre-commencement survey will be undertaken for those features to be directly or indirectly impacted during construction. Where evidence of a burrow is identified, a suitably qualified ecologist will determine those additional sensitive methodologies necessary to avoid damage or disturbance to the burrow, including the establishment of additional buffers. Where such impacts cannot be avoided and given the protection afforded to this species, a mitigation licence may be required prior to construction progressing;
- GCN - the retained on-site pond and adjacent off-site ponds, and suitable terrestrial habitats within the Site surrounding them, will be included within EPZs. Sensitive clearance of any suitable terrestrial vegetation within 250m of any ponds confirmed to support the species, or those off-site ponds not able to be accessed for survey, under supervision by an ECoW will then be completed in line with a mitigation strategy;
- Reptile species - suitable reptile habitat is to be subject to a phased habitat manipulation exercise prior to construction works commencing. Any reptiles found are to be moved to adjacent retained habitats away from the working corridors, to prevent accidental killing or injury. The construction areas are to be retained as unsuitable habitat for the duration of the construction works;
- The measures set out for IEF species will also safeguard other species present or potentially present, such as otter, brown hare, polecat and hedgehog;
- In relation to the Cable Corridor, the ECMS would contain measures to deliver the quick re-establishment of habitats following back-filling where habitat has been removed for the cable trench; and
- Temporary lighting may be required within the Site during the construction stage. The sensitive measures to be implemented for any construction lighting will be based on best practice measures, informed by the ILP's 'Guidance Note 08/23 Bats and Artificial Lighting at Night '.

Operation

- 10.6.3 The primary and tertiary mitigation which has been evaluated as part of the operational stage assessment is outlined below.

Primary Mitigation

- Retained habitats across the Site will change from their current intensively managed state which supports the existing livestock and arable farming businesses, to areas of reduced



and sensitive management. This landscape scale change from intensively managed agricultural land to sensitively managed habitats within a solar farm development will have numerous inherent benefits to biodiversity as a result of the cessation of regular ploughing, harvesting, intensive grazing and high use of pesticides/herbicides/fertilisers which disturb soils and wildlife and reduces habitat structure/diversity, invertebrate abundance and water quality;

- Creation of a number of green corridors throughout the Solar Site along various existing underground utilities easements, which will comprise species-rich grassland creation; and
- An Ecological Mitigation and Enhancement Area, totalling approximately 10 ha, has been designed within the Proposed Development to provide enhanced habitat for a range of species, particularly targeting overwintering birds and ground nesting farmland birds. This area will provide enhanced year-round foraging and breeding opportunities for the farmland bird assemblage potentially displaced from the Solar Site and is located immediately to the south of it (parcel no. 6 as shown on the Illustrative Landscape and Ecology Strategy). This area will include:
 - Creation of wildlife ponds, surrounded by meadow grassland, within the c. 2.5 ha field adjacent to the off-site ancient woodland belt;
 - Within the field to the west of the central ditch further from the woodland edge, a series of shallow, temporary ponds, also known as 'wader scrapes' will be provided;
 - Within the westernmost parcel of the Ecological Mitigation and Enhancement Area, a 50/50 rotation of wild bird crops in accordance with the Sustainable Farming Scheme 2026 habitat type 'Unfertilised, unsprayed and unharvested cereal or linseed headlands', and fallow land (aiming to provide habitat for ground nesting birds such as lapwings) to be brought forward each year; and
 - In addition, the existing dry ditch will be enhanced to provide further foraging opportunities for birds in addition to becoming more favourable for use by water vole.

Tertiary Mitigation

- Lighting is not required within the Solar Site, but motion sensing security lighting will be provided at the BESS Site within substations and within the BESS, to be used only for maintenance and security purposes. Where this lighting is required, a sensitive lighting strategy will be agreed and implemented to avoid light spill on any retained habitats used by light-sensitive species such as bats;
- To deliver net benefits for biodiversity and compliance with the requirements of PPW, mitigation measures in respect of new habitat creation/enhancement combined with prescriptions for their sensitive long-term management to enable continued functionality of the Site for wildlife will be embedded within a LEMP, to be secured as a condition of any planning consent. To inform this document, an oLEMP has been submitted with the application as **Appendix F.4** The oLEMP has been produced with input from a professional ecologist and landscape consultant, as will the full LEMP. The document will describe habitat establishment measures for created habitats and sensitive ongoing management measures for habitat enhancement works for the Proposed Development, alongside a schedule for habitat monitoring and review. Key proposed habitat creation and enhancement measures include:
 - A range of valuable habitats, particularly targeting wintering birds (including teal) and breeding skylark but also of value to other species including water vole, reptiles and GCN within the Ecological Mitigation and Enhancement Area, as described above;
 - The enhancement of retained grassland, hedgerows and ditches – including the restoration, and where feasible wetting, of some currently dry ditches (subject to consultation with NRW and any necessary consents) - across the Solar Site and BESS



Site, in addition to the on-site pond, to increase botanical and structural diversity, improve habitat condition and associated value for a range of species;

- Measures to provide protection for protected species known or suspected to be present on Site, such as ground nesting birds, water vole, reptiles and GCN, during any habitat management and enhancement works;
- The Solar Site will require deer-proof fencing to surround the solar arrays. Mammal gates, measuring a minimum of 200 mm wide x 300 mm high are to be installed at 250 m intervals around the deer fencing to maintain the permeability of the fencing and allow small to medium sized mammals, including badger and hare, to continue to have access to the Site;
 - Provision of two barn owl boxes erected within the open habitats as shown on the Illustrative Landscape and Ecology Strategy;
 - Provision of two small entrance bird boxes and two woodpecker boxes erected within suitable habitats as shown on the Illustrative Landscape and Ecology Strategy;
 - Provision of four hibernacula features for amphibians and reptiles as shown on the Illustrative Landscape and Ecology Strategy; and
 - Considerable tree and hedgerow planting and extending existing woodland habitats, to benefit a range of wildlife and provide landscape screening functions. A total of approximately 8,200 m of native hedgerow, approximately 160 new trees and approximately 9,200 m² of woodland groups/copse is proposed across the Site.

Decommissioning

- 10.6.4 At the end of the Proposed Development's lifespan, the solar panels, BESS and other infrastructure would be removed, and the Site restored to its current land use.
- 10.6.5 The tertiary mitigation which has been evaluated as part of the decommissioning stage assessment is outlined below. No primary mitigation is anticipated at the decommissioning stage.
- The use of existing access routes and infrastructure to decommission the Site without additional higher value habitat impacts being required;
 - Requirement for compliance with wildlife legislation, including the protection afforded to birds, bat, reptiles and amphibians under the Wildlife and Countryside Act 1981 (as amended). This will include sensitively timed and completed dismantling of equipment so as not to harm protected species interests and supervision by an appointed ECoW as required;
 - There may be protected species licencing requirements, subject to future survey, particularly with respect to GCN, owing to the creation of higher value terrestrial and breeding habitats within the Solar Site;
 - An ECMS or similar document would be provided at this time detailing how protected species are safeguarded and including setting out measures to protect retained habitats. This document will also set out sensitive timing and methodologies of works located within the teal disturbance zone around the wet ditches, to avoid disturbance impacts on the local teal population.



10.7 Assessment of Significant Likely Effects

Construction

International Statutory Designated Sites

- 10.7.1 Adverse effects upon international statutory designated sites are assessed in full detail, as required under the Habitats Regulations, in the Shadow Habitats Regulations Assessment (sHRA) provided in **Appendix F.2**. A summary of this assessment, in addition to assessment of impacts on the component national statutory designation IEFs, is provided below.

The Dee Estuary SAC and Elwy Valley Woods SAC

- 10.7.2 Although these SACs are within 15 km of the Site, no potential impacts on these SACs are anticipated during the construction phase due to the reasons for their designation, their spatial separation from the Site and the type of Proposed Development at the Site. As such, negative effects on these designations are considered to be **Negligible** and therefore **Not Significant**.

The Dee Estuary SPA and Ramsar Site

- 10.7.3 Potential impacts on the Dee Estuary SPA and Ramsar site have been identified in relation to loss and/or fragmentation of functionally linked land for the designated bird species teal and disturbance of this species (within functionally linked land) from construction noise/vibration/lighting. This is because during the winter bird surveys, the only qualifying species for this SPA/Ramsar recorded in sufficient numbers within the Solar Site (>1% of SPA population on a regular basis) to suggest potential functional linkage of the habitat, was teal. It seems unlikely this population is part of the SPA/Ramsar population given the spatial separation from the Site (>9 km) and abundance of teal in north-east Wales overwinter¹⁴³. However, given a level of uncertainty, as a precaution for the purposes of this EIA and corresponding sHRA, the population is assessed as being potentially functionally linked.
- 10.7.4 During the surveys, teal were predominantly found to be using the wet ditches along or adjacent to the northern boundary of the Solar Site and less frequently the wider ditch network of the Solar Site, or rarely within the fields themselves. All such ditches will be retained and buffered as part of the primary mitigation described previously, with a number of ditches across the Solar Site to be restored, including wetting of some currently dry ditches (subject to consultation with NRW and any necessary consents), as part of enhancement measures for species including overwintering birds. Furthermore, the Ecological Mitigation and Enhancement Area will provide additional valuable wetland habitat, in the form of scrapes, an enhanced ditch and a series of permanently wet ponds, for this species. No adverse effects on the teal population using the Solar Site from loss or fragmentation of functionally linked habitat are therefore anticipated.
- 10.7.5 Construction activities have potential to cause temporary disturbance effects upon the local teal population from noise, vibration, vehicle/personnel movement and lighting. However, construction of solar farms is a relatively quick process and minimally disruptive due to their simple, lightweight and modular design with limited requirement for earthworks/foundations and no major or permanent structures. As such, potential disturbance effects upon the teal population are anticipated to be relatively limited and of only short duration. Furthermore, the fluctuation in numbers recorded across the winter bird surveys suggests that the ditches on and adjacent to the Solar Site are used as part of a much wider network of habitats that could be readily utilised by the birds if subject to disturbance.
- 10.7.6 Tertiary mitigation, in the form of sensitive timing (i.e. avoiding the main migratory and winter months of October to February inclusive) of works located within the teal disturbance zone (considered to be up to c.200 m¹⁴⁴) around the main wet ditch used by this species located

¹⁴³ Clwyd Bird Recording Group, Wright, C., Smith, D., Brenchley, A. (eds.), (2024), Northeast Wales Bird Report 2023, Number 45, Mold: Clwyd Bird Recording Group

¹⁴⁴ Disturbance distance inferred from similar species using [Disturbance Distances in selected Scottish Bird Species – NatureScot Guidance | NatureScot](https://www.nature.scot/doc/disturbance-distances-selected-scottish-bird-species-naturescot-guidance) - <https://www.nature.scot/doc/disturbance-distances-selected-scottish-bird-species-naturescot-guidance> - accessed 21 July 2025



along the northern boundary of the Solar Site (known as Bodoryn Cut), will be set out within the ECMS and would avoid such disturbance impacts on the teal population.

- 10.7.7 In light of the above, indirect negative effects on The Dee Estuary SPA and Ramsar site during construction, as a result of disturbance of teal within/adjacent to the Site during construction works, are considered to be **Negligible** and therefore **Not Significant**.

National Statutory Designated Sites

Coedydd ac Ogofau Elwy a Meirchion SSSI

- 10.7.8 This SSSI is known to support roosts of Natterer's bat, brown long-eared bat, pipistrelle bats and lesser horseshoe bat within its caves. These species are known to have Core Sustenance Zones (CSZs - the area surrounding a bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony) of up to 4 km¹⁴⁵. The only part of the Site within 4 km of this SSSI is the Cable Corridor, which will not be impacting any suitable bat habitat, and the BESS Site.
- 10.7.9 The BESS Site is approximately 6.52 ha and currently comprises two improved grassland fields of limited value to foraging and commuting bats. These fields are, however, bounded by hedgerows with trees, which will provide suitable bat foraging and commuting habitat. As part of the primary mitigation described previously, the BESS Site has been designed to retain and buffer all mature trees and the vast majority of hedgerow, with only limited hedgerow loss anticipated by the road to widen the access location and in the central hedgerow to provide an access track to the southern field. The retained trees and hedgerows will be protected from damage and lighting during construction through the CEMP/ECMS.
- 10.7.10 As such, any bats using these habitats at the BESS Site for foraging or commuting, including any bats associated with the roosts at Coedydd ac Ogofau Elwy a Meirchion SSSI, are unlikely to be detrimentally impacted. Indirect negative effects on Coedydd ac Ogofau Elwy a Meirchion SSSI during construction are therefore considered to be **Negligible** and **Not Significant**.

Non-Statutory Designated Sites

Morfa Rhuddlan [Candidate] Wildlife Site and Abergele grazing marsh [Candidate] Wildlife Site

- 10.7.11 There are two non-statutory candidate sites which fall within the majority of the northern section of the Solar Site, Morfa Rhuddlan [Candidate] Wildlife Site and Abergele grazing marsh [Candidate] Wildlife Site. Both sites are candidate sites designated for their grazing marsh habitats.
- 10.7.12 The Proposed Development has been designed to retain and buffer the important habitats of these Candidate Wildlife Sites, which primarily comprise the ditches and hedgerows, due to the poor value of the grassland. Due to underground utilities, large corridors of grassland easements within these sites will also be retained and enhanced. However, there are potential impacts from land-take causing temporary long-term (40 years) but reversible (after decommissioning) habitat damage/loss to grassland habitat within the Candidate Wildlife Sites during construction.
- 10.7.13 In addition to direct, temporary long-term and reversible habitat loss, such habitats may also be subject to direct and indirect, temporary (short-term) and reversible degradation impacts, including damage and disturbance arising from encroachment by machinery, and pollution of surface water (in particular silt from disturbed soils entering wet ditches within the Candidate Wildlife Sites via surface water run-off) during construction works. Tertiary mitigation, in the form of the delivery of the CEMP and ECMS and provision of EPZs for valuable habitats as

¹⁴⁵ <https://www.bats.org.uk/our-work/landscapes-for-bats/core-sustenance-zones>



summarised previously, will however reduce such risks to **Negligible** and therefore **Not Significant**.

10.7.14 Both Candidate Wildlife Sites are considered to be of limited ecological value due to historical agricultural improvement and intensive management which has limited the structural and botanical diversity of these fields and ditches and consequently limited the extent of fauna supported, in particular, foraging opportunities for wintering birds and bats. Whilst this area of the Site is within the tidal flood zone (low risk), only small areas within it are also within the fluvial flood zone (low risk) and surface water/small watercourses flood zone (low to high risks), flooding is not a regular occurrence, with the grassland typically remaining dry for most of the year. The Candidate Wildlife Sites within the Site are therefore considered to be of poor quality overall.

10.7.15 The effect on Morfa Rhuddlan [Candidate] Wildlife Site and Abergele grazing marsh [Candidate] Wildlife Site is therefore characterised as a temporary, reversible, long-term, direct and indirect effect, significant at the **Site level** only and therefore **Not Significant**.

Coed Parc Kinmel [Candidate] Wildlife Site

10.7.16 There is a non-statutory candidate site which the proposed Cable Corridor linking the Solar Site to the BESS Site passes through, Coed Parc Kinmel [Candidate] Wildlife Site, designated for its coniferous woodland.

10.7.17 The Proposed Development will result in direct, temporary and reversible effects on circa 740 m of Coed Parc Kinmel [Candidate] Wildlife Site located along the Cable Corridor, as a trench approximately 2 m wide is dug to install the underground cable, which, via the CEMP/ECMS will then be backfilled and the previous habitat restored. The Cable Corridor has been carefully routed to follow an existing track, to protect the important habitats of this Candidate Wildlife Site, which comprise various blocks of woodland, including coniferous plantation woodland, semi-natural mixed woodland and plantation mixed woodland. As such, no loss of mature trees is anticipated, however, some pruning/crown lifting will likely be required to allow access during cable installation.

10.7.18 Indirect effects may also arise during construction including temporary and reversible damage/deterioration to Coed Parc Kinmel [Candidate] Wildlife Site habitats located immediately adjacent to the Cable Corridor, as a result of accidental damage or soil compaction by machinery, or deterioration through sedimentation, dust or pollution run-off. Tertiary mitigation, in the form of the delivery of the CEMP and ECMS and provision of EPZs for such habitat, in addition to the short duration of the works, will however reduce such risks to **Negligible** and therefore **Not Significant**.

10.7.19 The effect on Coed Parc Kinmel [Candidate] Wildlife Site is therefore characterised as direct, temporary, short term and reversible, significant at the **Site level** only and therefore **Not Significant**.

Habitats

Priority Habitat: Coastal and Floodplain Grazing Marsh

10.7.20 Impacts on coastal and floodplain grazing marsh priority habitats are discussed above in relation to Morfa Rhuddlan [Candidate] Wildlife Site and Abergele grazing marsh [Candidate] Wildlife Site. For the reasons detailed above, the effect on coastal and floodplain grazing marsh is characterised as a temporary, long-term (40 years), reversible (following decommissioning), direct and indirect effect, significant at the **Site level** only and therefore **Not Significant**.

Priority Habitat: Wood-Pasture and Parkland

10.7.21 The Proposed Development will result in direct, temporary and reversible effects on circa 200 m of wood-pasture and parkland priority habitat located along the Cable Corridor within Kinmel



Park and Bodelwyddan Park, as a trench approximately 2 m wide is dug to install the underground cable, which, via the CEMP/ECMS will then be backfilled and the previous grassland habitat restored. The Cable Corridor has been designed to avoid any significant impacts on trees, as demonstrated in the Arboricultural Impact Assessment, which is submitted as a standalone document as part of the planning application.

10.7.22 Indirect effects may also arise during construction including temporary and reversible damage/deterioration to wood-pasture and parkland habitats located immediately adjacent to the Cable Corridor, as a result of accidental damage or soil compaction by machinery, or deterioration through sedimentation, dust or pollution run-off. Tertiary mitigation, in the form of the delivery of the CEMP and ECMS and provision of EPZs for such habitat, will however reduce such impacts to **Negligible** and therefore **Not Significant**.

10.7.23 The effect on wood-pasture and parkland habitat is therefore characterised as direct, temporary, short term and reversible, significant at the **Site level** only and therefore **Not Significant**.

Ancient Woodland

10.7.24 There are two areas of Restored Ancient Woodland and Plantation on Ancient Woodland Site which the proposed Cable Corridor linking the Solar Site to the BESS Site passes adjacent to. Additionally, there is a belt of Restored Ancient Woodland immediately adjacent to the southern boundaries of the Solar Site. The Proposed Development provides a 15 m buffer to the ancient woodland adjacent to the Solar Site to avoid any impacts on these habitats. Furthermore, the Cable Corridor route has been designed to avoid any significant impacts on trees, as detailed in the Arboricultural Impact Assessment with the proximity of the works mitigated by crown lifting operations and hand digging under arboricultural supervision.

10.7.25 Indirect impacts may arise during construction, including temporary and reversible damage/deterioration to ancient woodland sites as a result of accidental damage or soil compaction by machinery or deterioration through sedimentation, dust or pollution run-off. Tertiary mitigation, in the form of the delivery of the CEMP and ECMS and provision of EPZs for such habitat, will however reduce such impacts to **Negligible** and therefore **Not Significant**.

10.7.26 Direct and indirect negative effects on adjacent ancient woodland during construction is therefore considered to be **Negligible** and **Not Significant**.

Priority Habitat: Native Hedgerows and Mature Trees

10.7.27 The Proposed Development will result in the direct loss of approximately 1,170 m of hedgerow habitat necessary to facilitate the Proposed Development, including breaches through hedgerows required to facilitate the 8 km long Cable Corridor, some widening of field access points at the Solar Site and BESS Site, the creation of a new access point into the northern part of the Solar Site and an operation track into the southernmost field at the BESS.

10.7.28 The design of the Proposed Development has included the retention and appropriate buffering of all mature trees, such that no direct mature tree loss is anticipated.

10.7.29 Indirect impacts may also arise during construction, including temporary and reversible damage/deterioration to hedgerow and mature tree habitat as a result of accidental damage or soil compaction by machinery or deterioration through sedimentation, dust or pollution run-off. Tertiary mitigation, in the form of the delivery of the CEMP and ECMS and provision of EPZs for such habitat, will however reduce such impacts to **Negligible** and therefore **Not Significant**.

10.7.30 The effect on native hedgerow habitat is therefore characterised as a direct, permanent, long-term, irreversible and negative effect, significant at the **Site level** only and therefore **Not Significant**.



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Wet Ditches

- 10.7.31 Numerous wet ditches are present within the Site, primarily associated with adjacent hedgerow features. All wet ditches have been retained within the design of the Proposed Development with suitable buffers, such that no direct loss of this habitat is anticipated.
- 10.7.32 Indirect impacts may arise during construction, including temporary and reversible damage/deterioration to ditches as a result of accidental damage by machinery or deterioration through sedimentation, dust or pollution run-off (in particular silt from disturbed soils). Tertiary mitigation, in the form of the delivery of the CEMP and ECMS and provision of EPZs for such habitat, will however reduce such impacts to **Negligible** and therefore **Not Significant**.
- 10.7.33 Direct and indirect negative effects on wet ditches across the Site during construction is therefore considered to be **Negligible** and **Not Significant**.

Priority Habitat: Ponds

- 10.7.34 The Proposed Development will retain and enhance the single pond within the Site. However, indirect impacts may arise during construction, including temporary and reversible damage/deterioration by machinery or deterioration through sedimentation, dust or pollution run-off (in particular silt from disturbed soils). Tertiary mitigation, in the form of the delivery of the CEMP and ECMS together with the provision of EPZs, will, however reduce such impacts to **Negligible** and therefore **Not Significant**.
- 10.7.35 Direct and indirect negative effects on pond habitat during construction is therefore considered to be **Negligible** and **Not Significant**.

Species

Breeding Birds

- 10.7.36 The loss and degradation of potential bird nesting and foraging habitats during construction would primarily be restricted to the loss of arable land and grassland, although some loss of hedgerow habitat is anticipated. The breeding bird surveys carried out across Spring 2025 and presented in full in **Appendix F.1**, most notably indicate that the Solar Site supports 9-15 pairs of skylark and 2-3 pairs of lapwing, both of which are ground nesting species that would be impacted by the loss of agricultural land resulting from the Proposed Development. Other conservation concern species such as linnet, reed bunting, teal and wheatear are likely to be less impacted as they nest within the hedgerows, field margins or along the ditches and will also still be able to forage on-site.
- 10.7.37 During the Scoping process, NRW noted that the Site appeared suitable for barn owl and impacts on this species should be considered. However, this species was not recorded during any of the bird surveys at the Solar Site, which included a dusk survey. They also weren't incidentally recorded during any other survey work, including nighttime bat walkovers. This species is therefore considered to be currently absent from the Site, however, if they were present, negative effects are anticipated to be limited due to the retention of any potential tree roosting sites and enhancement in the form of provision of two barn owl boxes and sensitive management of the grassland, which will provide better foraging opportunities.
- 10.7.38 Direct harm to birds at the nest (and their eggs and young) would be avoided through the adoption of standard sensitive working practices to ensure legislative compliance delivered via the ECMS/CEMP as set out in more detail previously.
- 10.7.39 All mature trees and the vast majority of hedgerows (except for small breaches required to facilitate the Cable Corridor, some widening of field access points at the Solar Site and BESS Site, the creation of a new access point into the northern part of the Solar Site and an operation track into the southernmost field at the BESS Site) would be retained. Breeding bird habitat loss would therefore primarily be restricted to the conversion of currently open arable



and pastureland to grassland and removal of the open ground environment by the solar panels. Continued foraging opportunities will be provided within the Solar Site and there will be potential for such ground nesting species including skylark and lapwing to continue to nest within the numerous utility easement corridors running through the Solar Site (including corridors up to 40 m wide and totalling approximately 13 ha) that can be managed to maximise the suitability for ground nesting birds breeding (e.g. varied sward length). While it is uncertain how much continued skylark breeding would occur within these corridors, assuming 10 ha of the easements grassland is capable of supporting skylark population densities of 0.27 pairs per hectare, as conservatively based on research¹⁴⁶ for natural grassland, it is predicted that up to approximately three pairs will continue to breed within the Solar Site.

10.7.40 The Ecological Mitigation and Enhancement Area, which measures approximately 10 ha, has been designed to optimise opportunities for both overwintering birds and breeding skylark and lapwing in particular. This includes approximately 7.5 ha of fallow land, wild bird crops, and rough grassland with scrapes within large open fields that are therefore well suited to skylark and lapwing nesting. It is considered that this area could readily support any displaced lapwing population and approximately six pairs of skylark (based on assumed maximum densities of up to 0.8 pairs per hectare¹⁴⁷). While skylark were recorded on one of the breeding bird surveys on the northern edge of this area, no breeding territories were noted. This area will also provide enhanced year-round foraging resource for the local skylark population that will further boost productivity in the surrounding landscape and assist with mitigating impacts upon this species further. This area, and the additional 2.5 ha to the east, which is less suited to skylark/lapwing owing to the proximity of the adjacent woodland, will also provide enhanced foraging opportunities for a wide variety of other declining farmland and wetland species recorded by the breeding bird surveys.

10.7.41 While skylark is a Priority and Amber List species owing to historic declines, much of which is due to agricultural practices and the decline is a widespread trend across Europe, they remain common and widespread locally and throughout Wales. The population recorded on-site dropped significantly from the first two surveys and appeared to stabilise below nine pairs, however, as a precaution, a broader range in pairs has been estimated (9-15). Following specific on-site mitigation and enhancements that will provide for approximately nine pairs, the potential displacement of the remaining small number of breeding pairs (0-6 pairs) into the abundance of suitable habitat in the surrounding landscape is considered to be outweighed by the overall benefit to the wider breeding bird assemblage delivered by the mitigation.

10.7.42 In light of the above, the long-term loss of arable and pasture habitat, mitigated through the provision of on-site green infrastructure with associated changes in land management and sward diversity to enhance suitability for ground nesting birds, and the Ecological Mitigation and Enhancement Area would result in both a **Not Significant** temporary (long-term) negative **Site Level** effect on the skylark population and a temporary (long-term) **Not Significant** positive **Site Level** effect on the wider bird assemblage.

10.7.43 The ECMS will include sensitive working methodologies (e.g. sensitive timing of works and pre-commencement checks) to prevent or minimise any disturbance of nesting and foraging habitat through noise, visual and human disturbance during construction. This would also only be of short duration given the 12-24-month construction programme. As such, this temporary short-term negative effect is considered to be significant at the **Site level** only and therefore **Not Significant**.

Wintering Birds

10.7.44 Specific impacts on teal have been considered in detail within the assessment of The Dee Estuary SPA/Ramsar section previously. This section discusses the wider wintering bird assemblage at the Site.

10.7.45 During the winter bird surveys at the Solar Site, many species were found to be using the wet ditches and hedgerow habitat spread across the Solar Site, with some foraging observed

¹⁴⁶ Donald, P.F. (2004). The Skylark. Poyser, London

¹⁴⁷ Fox, H (2022) Blithe Spirit: Are Skylarks Being Overlooked in Impact Assessment? CIEEM Best Practice Magazine Issue 117



within the fields, particularly associated with the north of the Solar Site. The diversity and abundance of species varied greatly across the visits, suggesting that the Solar Site forms part of a wider network of habitats across the landscape utilised by overwintering and migratory species. A number of declining farmland and wetland species, including gulls, waders and waterfowl were recorded, reflecting the wet nature of parts of the Solar Site during winter, presence of ditches and proximity to estuarine habitats along the North Wales coast.

- 10.7.46 All of the wet ditch habitat across the Solar Site is being retained within the proposals, along with a 10 m buffer along the main running water ditch along the Solar Site's northern boundary (Bodoryn Cut), and 5 m buffer from the bank tops on both sides across the vast majority of the internal ditch lengths. The majority of the hedgerow habitat is also being retained. However, some foraging flocks were recorded within the arable and pasture fields, some of which will be lost to the Proposed Development.
- 10.7.47 While some continued foraging opportunities for winter birds will be retained within the numerous utility easement corridors running through the Solar Site, and enhanced foraging provided with the enhanced ditches, it is likely that the majority of the species using the open field habitats will be displaced into the surrounding farmland. These areas are not considered to be critical to the overwintering or migratory success of the species recorded, owing to their sporadic presence across the surveys and prevalence of similar habitats in the wider landscape.
- 10.7.48 The 10 ha Ecological Mitigation and Enhancement Area has been designed to optimise opportunities for birds in particular, with the new habitats designed to provide significant wetland and farmland foraging opportunities for overwintering birds including sacrificial wild bird crops, scrapes and ponds. This will provide more permanent high-quality year-round foraging habitat for the various farmland and wetland species recorded. The presence of new permanently wet water features will deliver notable benefits for certain species such as teal, shelduck and mallard.
- 10.7.49 The long-term loss of open field habitat, mitigated through the provision of on-site enhancements with associated changes in land management and habitat diversity to enhance foraging opportunities for wintering birds and the Ecological Mitigation and Enhancement Area, would therefore result in **Negligible to Site Level** positive, but **Not Significant**, effects on the overwintering and migratory bird assemblage.
- 10.7.50 The ECMS will include sensitive working methodologies (e.g. sensitive timing of works) to prevent or minimise any disturbance of foraging habitat through noise, visual and human disturbance during construction. This would also only be of short duration given the 12-24-month construction programme. As such, this temporary negative effect is considered to occur at the **Site level** only and therefore is **Not Significant**.

Bats (Roosting)

- 10.7.51 The Ground Level Tree Assessment identified numerous trees with potential roosting features (PRFs) suitable for roosting bats across the Site and immediately adjacent to the Site. No mature trees are proposed to be removed as part of the Proposed Development, therefore no potential loss of any bat roost or direct harm to bats therein is anticipated.
- 10.7.52 Indirect impacts may arise during construction, including temporary and reversible impacts of accidental damage/disturbance to retained bat roost(s), if present during works. Furthermore, there is a temporary and reversible risk of noise and light pollution during the construction phase stage which could result in roost entrapment and/or abandonment if impacting upon any bat roosts. Following the implementation of measures set out in the CEMP and ECMS, including sensitive lighting measures during construction and the appropriate timing of the works together with the provision of EPZs, such potential impacts will, however, be reduced to **Negligible** and therefore **Not Significant**.
- 10.7.53 Direct and indirect negative effects on roosting bats during construction is therefore considered to be **Negligible** and **Not Significant**.



Bats (Foraging / Commuting)

- 10.7.54 The Proposed Development will retain, buffer and enhance the vast majority of habitats suitable for foraging and commuting bats, including the network of hedgerows and ditches, and grasslands. Furthermore, as described above in relation to those habitats themselves, no fragmentation impacts are anticipated and with tertiary mitigation, degradation of bat foraging/commuting habitat and noise and light spill at night can also be avoided. The small extent of temporary (long-term) and reversible loss of habitat for foraging/commuting bats, which is currently of limited quality due to its current intensive management, is anticipated to be more than offset by the enhancement of existing habitats and creation of new habitats, particularly hedgerow for which a net increase of 7,030 m is proposed, across the Site.
- 10.7.55 Direct and indirect effects on foraging and commuting bats during construction is therefore considered to be **Negligible** and **Not Significant**.

Badger

- 10.7.56 There is potential for indirect and temporary disturbance to arise through light and noise pollution on badger foraging and commuting habitats during construction. Following implementation of measures set out within the CEMP and ECMS however, including implementation of sensitive timing and lighting, such potential impacts will be reduced to a **Negligible** level and therefore are **Not Significant**.

Otter

- 10.7.57 Records of otter activity have been retrieved in the area north of (and outside) the Solar Site which indicate use of these habitats by this species in the past and within the Site two potential otter prints were recorded along the banksides of wet ditch 5.16 during one of the detailed surveys in 2025. As such, occasional presence for foraging/dispersal is assumed. The Proposed Development will retain all suitable habitats (i.e. the wet ditches and pond) with significant buffers, therefore, no indirect, permanent impacts to otter from habitat loss or fragmentation during construction are anticipated.
- 10.7.58 Indirect temporary impacts may arise during construction, including damage/deterioration to suitable habitat, primarily wet ditches and the pond, as a result of accidental damage by machinery or deterioration through sedimentation, dust or surface water pollution run-off. Tertiary mitigation, in the form of the delivery of the CEMP and ECMS and provision of EPZs for such habitat, will however reduce such impacts to **Negligible** and therefore **Not Significant**.
- 10.7.59 There is also potential for indirect and temporary disturbance to otters to arise through visual, light and noise pollution during construction. Following implementation of measures set out within the CEMP and ECMS however, including implementation of sensitive timing and lighting, such potential impacts will be reduced to a **Negligible** level and therefore are **Not Significant**.

Water Vole

- 10.7.60 Evidence of water vole activity has been identified within the Solar Site along the banksides of ditches 5.14, 1.1 and 1.3. Additionally, potential water vole burrows have been identified along ditches 1.2, 1.3, 3.7, 3.13, 5.3, 5.6 and 5.14. The results suggest a small population inhabit the Solar Site and potentially utilises the wet and dry ditches depending on management. The Proposed Development will retain these habitats with sufficient buffers, therefore, no direct, permanent impacts to water vole from habitat loss or fragmentation during construction are anticipated.
- 10.7.61 Indirect temporary impacts may arise during construction, including damage/deterioration to suitable habitat, primarily wet ditches and the pond, as a result of accidental damage by machinery or deterioration through sedimentation, dust or surface water pollution run-off. Tertiary mitigation, in the form of the delivery of the CEMP and ECMS and provision of EPZs



for such habitat, will however reduce such impacts to **Negligible** and therefore **Not Significant**.

- 10.7.62 There is also potential for indirect and temporary disturbance to water vole to arise through visual disturbance and noise pollution during construction. Following implementation of measures set out within the CEMP and ECMS however, such potential impacts will be reduced to a **Negligible** level and therefore are **Not Significant**.

Great Crested Newt

- 10.7.63 The desk study found four historic records of GCN between 2009 and 1993 associated with the single on-site pond (P1 on **Figure 10.1**), however, the eDNA results from 2025 returned a negative result for GCN, suggesting the current absence of this species from this waterbody within the Site.
- 10.7.64 Pond P6, located 135 m north of the Site, was confirmed through the eDNA survey to support GCN, and it is therefore possible that GCNs utilising pond P6 could also be present within the terrestrial habitats within the northern section of the Solar Site. Habitats of higher value to GCNs include the native hedgerows and ditches. Although the grassland is of limited value to GCNs due to its limited structural diversity owing to intensive management and grazing, it may be used by this species to commute between habitats of higher value, and in the absence of mitigation there is therefore a very small risk of accidental killing or injuring individuals from construction activities including movement of vehicles across the Solar Site.
- 10.7.65 The single on-site pond at the Solar Site is being retained with a 30m buffer around it for habitat enhancements. This buffer is also applied to the off-site ponds that are within 30m of the Site. It is considered that standard sensitive clearance methodologies and supervision, as detailed previously, set out in the ECMS/CEMP, will mean that the risk of harm to GCN during construction is avoided. However, if one is found during the sensitive clearance works, works must stop, and a licence must be sought before works can continue.
- 10.7.66 Additionally, off-site ponds P17 and P18 are confirmed to support GCN, located 45 m and 65 m south of the Cable Corridor respectively and ponds at the Asaph Business Park near to P17 and P18 are known to support a large population of the species. However, the digging within the Cable Corridor is not anticipated to impact GCN within ponds P17 and P18, due to the location of the cable trench being entirely along Glascoed Road (B5381) in the vicinity of these ponds. Wanborough Road provides a partial barrier to newt movement, and no groundworks will occur within 100m of the ponds.
- 10.7.67 Furthermore, very minimal impacts on hedgerows are proposed and the modified grassland is sub-optimal terrestrial habitat for GCNs, being suitable for occasional foraging and dispersal only. Impacts on any population utilising the pond are therefore highly unlikely. No access was granted to pond P14, although this pond is located far more than 250 m from the Site.
- 10.7.68 GCN were confirmed to be absent from ponds P1, P20 and P21. Other ponds within 250 m of the Solar Site and BESS Site and 100 m from the Cable Corridor could not be surveyed due to access not being granted. The overall effect from the small magnitude of suitable terrestrial habitat loss on GCN is therefore characterised as an indirect, long-term, irreversible and negative effect, significant at the **Site level** only and therefore **Not Significant**.
- 10.7.69 In addition, indirect temporary impacts may arise during construction, including damage/deterioration to suitable habitat, primarily the nearby off-site ponds known to support the species, as a result of deterioration through sedimentation, dust or surface water pollution run-off. Tertiary mitigation, in the form of the delivery of the CEMP and ECMS and provision of EPZs for such habitat, will however reduce such impacts to a **Negligible** level and therefore are **Not Significant**.

Reptiles



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10.7.70 Common reptile species are considered to potentially be present within suitable terrestrial habitats within the Site. Such suitable terrestrial habitats are considered to be limited to the ditches, hedgerows, scrub and field margins which are predominantly being retained and buffered from the development proposals. Suitable habitat loss during construction is therefore very limited in magnitude.

10.7.71 It is considered that standard sensitive clearance methodologies and supervision, as detailed previously, set out in the ECMS/CEMP will mean that the risk of harm and disturbance to reptiles during construction is reduced to a **Negligible** level and therefore are **Not Significant**.

Operation

Statutory Designated Sites

10.7.72 In relation to Coedydd ac Ogofau Elwy a Meirchion SSSI, any bats roosting within this designation and utilising the BESS Site for foraging or commuting may be impacted by degradation of the BESS Site habitats during the operational phase stage from suboptimal management in addition to light spill, resulting in indirect, temporary (long-term) and reversible impacts to bats. However, tertiary mitigation, in the form of the delivery of the LEMP, in addition to the absence of lighting requirements (other than small doorway lights as described in relation to roosting bats below), will reduce such potential adverse impacts to **Negligible** and therefore **Not Significant**. Furthermore, delivery of grassland enhancements and bolstering the boundary hedgerows with new planting will be beneficial for foraging bats through increasing the capacity of the habitat to support more diverse flora and therefore invertebrate assemblages as potential foraging resource.

10.7.73 Although there will be some noise generated from the BESS equipment, this noise is anticipated to be quieter at nighttime. The BESS equipment is unavoidably close to the western hedgerow of the BESS Site, which may cause a decrease in bat commuting or foraging along this particular feature. However, the increased foraging opportunities delivered across the BESS Site from the enhanced habitats to be sensitively managed through the LEMP is considered to offer sufficient alternative foraging habitats, in addition to the alternative nearby commuting corridors available for bats to use in this area. As such, and with consideration of the likely small number of bats from the SSSI using the limited extent of habitats within the BESS Site, no potential effects on Coedydd ac Ogofau Elwy a Meirchion SSSI via commuting/foraging bats are anticipated.

10.7.74 Owing to their separation distance from the Site and absence of impact pathways, no significant operational effects on any of the other identified statutory designations are anticipated.

Non-Statutory Designated Sites

10.7.75 Owing to the nature of the Proposed Development, comprising energy generation from solar panels and energy storage, and with tertiary mitigation, in the form of the delivery of the LEMP as summarised previously, no significant negative operational effects on the two non-statutory designations covering the northern portion of the Solar Site, or Coed Parc Kinnel (Candidate) Wildlife Site which the Cable Corridor passes through are anticipated.

Habitats

10.7.76 Maintenance requirements for the Proposed Development are limited and will not have any notable direct or indirect impacts upon habitats during operation. No adverse effects are therefore anticipated during operation.

10.7.77 Furthermore, suboptimal management of habitats will also not occur owing to the measures set out in the LEMP. With the provision of the mosaic of habitats at the Ecology Mitigation and Enhancement Area, enhancement of the retained on-Site pond/ditches, establishment of notable new hedgerow (totalling approximately 8,200 m) and tree planting (totalling approximately 160 new trees in addition to approximately 9,200 m² of woodland/copse) across



the Solar and BESS Sites, and meadow grassland creation around the panels and covering the various utilities easement corridors, in addition to surrounding the equipment at the BESS Site, the Proposed Development is anticipated to deliver long-term **Significant** positive effects at a **Local level** for habitats (coastal floodplain and grazing marsh, hedgerows, trees, wet ditches, grassland and pond).

Species

Breeding Birds

- 10.7.78 As set out above, the majority of effects would occur during the construction stage, primarily through the long-term loss and degradation of ground nesting bird habitats as a result of arable and pastureland being converted to grassland with solar panels. No additional risks are considered for skylark (or other birds) as the suitable habitat would have been removed during the construction phase and is therefore accounted under this stage.
- 10.7.79 Although there will be some noise generated from the solar inverters and the BESS equipment, such constant, low frequency noise is not known to deter breeding birds, and species will quickly habituate to this.
- 10.7.80 Furthermore, skylark, and the wider breeding bird assemblage at the Solar Site, will benefit from enhanced foraging and breeding opportunities provided by the Ecological Mitigation and Enhancement Area, and habitat enhancements across the Site, as described above. The notable new hedgerow and tree planting will also offer considerable additional breeding and shelter opportunities for many species of birds within the Site, while the ditch enhancements will provide increased opportunities for wetland species to nest. Furthermore, two barn owl nest boxes, two small entrance nest boxes (suitable for small birds such as great tit, tree sparrow, pied flycatcher and redstart) and two woodpecker boxes are proposed to provide additional opportunities for these target species within the Solar Site.
- 10.7.81 In light of this, the Proposed Development is anticipated to deliver long-term positive effects at a **Site level** (or potentially beyond for certain species), and therefore **Not Significant**, for breeding birds.

Wintering Birds

- 10.7.82 Similarly to the above, the majority of effects on the winter bird assemblage would occur during the construction stage, primarily through the long-term loss of open field habitats as a result of arable and pastureland being converted to grassland with solar panels. However, all of the wet ditches will have been retained and dry ditches enhanced to hold water, resulting in an increase in ditch habitat for those species that favour this habitat for foraging (e.g. teal).
- 10.7.83 Although there will be some noise generated from the solar inverters and the BESS equipment, such constant, low frequency noise is not known to deter winter foraging birds, and species will quickly habituate to this.
- 10.7.84 Furthermore, the wintering bird assemblage at the Solar Site will benefit from enhanced foraging opportunities provided by the Ecological Mitigation and Enhancement Area, which includes ponds, scrapes, fallow land and bird crop to specifically benefit wintering birds, in addition to habitat enhancements across the Site as described previously. As such, the Proposed Development is anticipated to deliver long-term positive effects at a **Site level** (or potentially beyond for certain species), and therefore **Not Significant**, for wintering birds.

Bats (Roosting)

- 10.7.85 Retained potential bat roosting features within the Site could be at risk of indirect, temporary (long-term) and reversible impacts from increased light spill. However, no lighting is proposed at the Solar Site and only minimal lighting proposed at the BESS Site in the form of small lights at the entrance doors of the BESS equipment and the substation compound which will be motion-sensitive and therefore only turned on very infrequently (in the rare event that



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maintenance access is required at night) and for a short period of time. This is therefore not anticipated to have an impact on any nearby roosting bats.

10.7.86 Furthermore, provision of considerable tree planting (totalling approximately 160 new trees in addition to approximately 9,200 m² of woodland/copse) across the Solar and BESS Sites will provide enhanced future roosting opportunities for bats as the trees mature and develop potential roost features over time.

10.7.87 Although there will be some noise generated from the solar inverters and the BESS equipment, such constant, low frequency noise is not known to disturb roosting bats, with anecdotal evidence of roosting bats habituating to chronic noise. As such, effects on roosting bats are considered to be **Negligible** and therefore **Not Significant**.

Bats (Foraging / Commuting)

10.7.88 The retained and proposed habitats of suitability for foraging and commuting bats are at risk of degradation during the operational phase stage from suboptimal management in addition to light spill, resulting in indirect, temporary (long-term) and reversible impacts to bats. However, tertiary mitigation, in the form of the delivery of the LEMP, in addition to the absence of lighting requirements (other than small doorway lights as described above), will reduce such adverse impacts to **Negligible** and therefore **Not Significant**.

10.7.89 Furthermore, delivery of habitat enhancements and creation of new trees, woodland and hedgerows will be beneficial for foraging bats through increasing connectivity for bats across the Site and the capacity of the habitat to support more diverse flora and therefore invertebrate assemblages as potential foraging resource.

10.7.90 Although there will be some noise generated from the solar inverters and the BESS equipment, this noise is anticipated to be quieter at nighttime. The majority of the inverters at the Solar Site are sufficiently distant from foraging or commuting resources to not impact upon them, however, a small number are unavoidably adjacent to hedgerows that are used by bats. In addition, the BESS equipment is unavoidably close to the western hedgerow of the BESS Site. This may cause a decrease in bat commuting or foraging along these particular features. However, the increased foraging opportunities delivered across the Solar Site and BESS Site from the new and enhanced habitats to be sensitively managed through the LEMP, in addition to the increased connectivity for bats from the new hedgerows, is considered to offer sufficient alternative foraging and commuting habitats, resulting in a betterment to foraging and commuting bats overall.

10.7.91 As such, the Proposed Development is anticipated to deliver long-term positive effects at a **Site level**, and therefore **Not Significant**, for foraging and commuting bats.

Badger

10.7.92 The Proposed Development could result in indirect effects on badger during the operational phase stage through increased light spill and restricted access to potential foraging areas from the deer-proof fencing installed across the Solar Site. Given the absence of lighting requirements (other than small motion-activated doorway lights for security at the BESS Site only as described above), provision of mammal gates within the deer-proof fencing, and retention/enhancement of the majority of habitats of value outside of the fenced area, such impacts are considered to be **Negligible** and therefore **Not Significant**.

10.7.93 Additionally, it is likely that the enhanced and created habitats across the Site delivered and sensitively managed through the LEMP will provide improved foraging opportunities for this species. In light of this, operational effects upon badger would be **Negligible** and therefore **Not Significant**, albeit there might be some insignificant beneficial effects from increased foraging opportunities as a result of habitat enhancement and creation.

Otter



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10.7.94 The retained and proposed habitats of suitability for otter are at risk of degradation during the operational phase stage from suboptimal management in addition to light spill, resulting in indirect, temporary (long-term) and reversible impacts to otter. However, tertiary mitigation, in the form of the delivery of the LEMP, in addition to the absence of lighting requirements (other than small doorway lights as described above), will reduce such adverse impacts to **Negligible** and therefore **Not Significant**.

10.7.95 Furthermore, delivery of habitat enhancements including the enhancement of ditches and grassland on the bank tops will be beneficial for otter.

10.7.96 Although there will be some noise generated from the solar inverters, this noise is anticipated to be quieter at nighttime, and such constant, low frequency noise is not known to deter this species, which will quickly habituate to the noise. As such, the Proposed Development is anticipated to deliver long-term positive effects at a **Site level**, and therefore **Not Significant**, for foraging and commuting otter.

Water Vole

10.7.97 The retained and proposed habitats used by water vole are at risk of degradation during the operational phase stage from suboptimal management in addition to light spill, resulting in indirect, temporary (long-term) and reversible impacts to this species. However, tertiary mitigation, in the form of the delivery of the LEMP, in addition to the absence of lighting requirements (other than small doorway lights as described above), will reduce such adverse impacts to **Negligible** and therefore **Not Significant**.

10.7.98 Furthermore, delivery of habitat enhancements including the enhancement of ditches and grassland on the bank tops will be beneficial for water vole.

10.7.99 Although there will be some noise generated from the solar inverters, this noise is anticipated to be quieter at nighttime, and such constant, low frequency noise is not known to deter this species, which will be able to habituate to the noise. As such, the Proposed Development is anticipated to deliver long-term positive effects at a **Site level**, and therefore **Not Significant**, for the local water vole population.

Great Crested Newt

10.7.100 The retained and proposed terrestrial habitats potentially used by GCN are at risk of degradation during the operational phase stage from suboptimal management in addition to light spill, resulting in indirect, temporary (long-term) and reversible impacts to this species. However, tertiary mitigation, in the form of the delivery of the LEMP, in addition to the absence of lighting requirements (other than small doorway lights as described above), will reduce such adverse impacts to **Negligible** and therefore **Not Significant**.

10.7.101 Furthermore, delivery of habitat enhancements including to the on-site pond and grassland across the Site, in addition to four hibernacula features, will be beneficial for the species by increasing foraging, refuge/hibernation and commuting opportunities, and potentially allowing the species to establish in the on-Site pond in future. In addition, provision of new ponds within the Ecological Mitigation and Enhancement Area has potential to deliver new habitat suitable for breeding GCN.

10.7.102 As such, the Proposed Development is anticipated to deliver long-term positive effects at a **Site level**, and therefore **Not Significant**, for GCN.

Reptiles

10.7.103 The retained and proposed habitats potentially used by common reptile species are at risk of degradation during the operational phase stage from suboptimal management, resulting in indirect, temporary (long-term) and reversible impacts to this species. However, tertiary mitigation, in the form of the delivery of the LEMP, will reduce such adverse impacts to **Negligible** and therefore **Not Significant**.



10.7.104 Furthermore, delivery of habitat enhancements including to the grassland across the Site, in addition to four hibernacula features, will be beneficial for reptiles by increasing foraging, refuge/hibernation and commuting opportunities. In addition, provision of new hedgerows across the Site (resulting in a net increase of 7,030 m of hedgerow) will increase commuting and refuge opportunities. As such, the Proposed Development is anticipated to deliver long-term positive effects at a **Site level**, and the impacts are therefore **Not Significant** for the local reptile population.

Decommissioning

Statutory Designated Sites

10.7.105 During decommissioning of the Proposed Development, the only potential impacts to statutory designated sites relate to The Dee Estuary SPA and Ramsar, due to potential disturbance of the qualifying species teal (within functionally linked land) from noise/vibration/lighting/vehicle and personnel movement associated with decommissioning activities at the Site.

10.7.106 The decommissioning stage will be a relatively quick process and minimally disruptive. As such, potential disturbance effects upon the local teal population are anticipated to be relatively limited and of only short to moderate duration. Tertiary mitigation, in the form of sensitive timing and methodologies of works located within the teal disturbance zone around the wet ditches, will be set out within the ECMS and would avoid such disturbance impacts on the teal population.

10.7.107 In light of the above, indirect negative effects on The Dee Estuary SPA and Ramsar site during construction are considered to be **Negligible** and therefore **Not Significant**.

Non-Statutory Designated Sites and Habitats

10.7.108 Through decommissioning, the Site would revert back to arable and pasture fields. There would be disturbance during the decommissioning phase as ground mounted structures (e.g. mounting frames) would be removed, followed by reinstatement of all ground disturbed by the works. It is anticipated that the new structural habitats and planting, would remain in place, therefore continuing to support habitats on-site.

10.7.109 Overall, there would be a long-term negative effect at a **Site level**, and therefore **Not Significant**, on grassland habitats through reversion to agricultural land, and on other habitats within the Site through cessation of the sensitive management delivered through the LEMP and recommencement of agricultural production. This would also be the same effect for the two non-statutory designations that cover the northern part of the Solar Site.

Species

10.7.110 Consideration will need to be given to the IEFs which may be present within the Proposed Development, including breeding and wintering birds, bats, badger, otter, water vole, GCN, reptiles and other notable species. The habitat enhancements made during the operational phase will increase the likelihood of these species being present and update surveys may be required to inform the possible need for any European Protected Species licencing (e.g. for GCN given the enhancement of terrestrial and aquatic habitat in addition to creation of new ponds on-site). However, the important habitat features (e.g. hedgerows, ditches, structural planting, ponds) that are more likely to support protected species, are anticipated to be retained during decommissioning and protected by the Proposed Development buffer zones.

10.7.111 Adverse effects to important IEFs during decommissioning would be avoided or reduced through inherent mitigation delivered through industry standard methodologies employed during the decommissioning phase via a Demolition Environmental Management Plan (DEMP) and ECMS (or equivalent documents), secured through appropriately worded planning conditions. Mitigation will employ appropriate protection measures to boundary features such as barriers, fences and signage as appropriate within the Site. Mitigation will also include



vegetation clearance works to be undertaken under the direction of an ecologist with regard to protected and notable species and habitats.

- 10.7.112 In light of the above, and subject to compliance with wildlife legislation, effects upon species are anticipated to be **Negligible** and therefore **Not Significant** during decommissioning, however, this will be subject to the value of the habitat established, colonisation by species and scale of reversion, which remains uncertain at this stage.

10.8 Secondary Mitigation and Enhancement

- 10.8.1 During the evolution of the Proposed Development, there has been careful consideration of the initial findings of the ecology work, allowing avoidance measures to be incorporated into the design of the Proposed Development.
- 10.8.2 Considering the identified effects on sensitive receptors during construction and operational phases, the mitigation hierarchy has been employed to alleviate adverse effects.
- 10.8.3 The section below identifies additional mitigation measures required to alleviate adverse effects set out above. This is in addition to and/or expands on the primary and tertiary mitigation previously set out.

Construction

- 10.8.4 All practicable mitigation in relation to protection of designated sites, important habitats and protected/priority species during construction of the Proposed Development will be incorporated into the CEMP and ECMS, and as such has been described within the primary and tertiary mitigation section.
- 10.8.5 Furthermore, loss of habitat during the construction phase will be mitigated and compensated for through the provision of new and enhanced retained habitats across the Site, particularly within the proposed Ecological Mitigation and Enhancement Area.
- 10.8.6 All effects during construction are either Negligible or negative at a Site level only, and therefore not significant. As such, no further secondary mitigation proposed.

Operation

- 10.8.7 All practicable mitigation in relation to protection of designated sites, important habitats and protected/priority species during operation of the Proposed Development will be incorporated into the LEMP, and as such has been described within the primary and tertiary mitigation section.
- 10.8.8 Furthermore, the provision of new and enhanced retained habitats across the Site, particularly within the proposed Ecological Mitigation and Enhancement Area, is anticipated to deliver a positive effect for habitats, significant at a Local level, and for most species (albeit assessed on a precautionary basis to only be at the Site level).
- 10.8.9 Nonetheless, as mentioned above in relation to commuting and foraging bats, the BESS equipment is unavoidably close to the western hedgerow of the BESS Site, which may cause a decrease in bat commuting or foraging due to noise. Although this potential effect is not significant, a noise barrier is proposed along this hedgerow to limit the extent of noise pollution beyond the boundary of the BESS equipment. This is detailed further within the Noise Impact Assessment accompanying the planning application.
- 10.8.10 No other secondary mitigation proposed.

Decommissioning



- 10.8.11 The same principles will apply as per construction mitigation i.e. provision of an ECMS/CEMP to safeguard designated site, habitat and protected species interests during decommissioning. Given the creation and management of new and higher value habitats on-Site, this will need to be informed by up-to-date surveys, particularly with respect to protected species such as badger, water vole and GCN. Where required, licencing should be sought to comply with wildlife legislation.

10.9 Residual Effects

Construction

- 10.9.1 Overall, adverse effects during the construction of the Proposed Development would be avoided or reduced to **Not Significant** levels through inherent mitigation and industry standard methodologies employed during the construction phase via a CEMP and ECMS, or equivalent documents, secured through appropriately worded planning conditions.
- 10.9.2 Habitat loss for ground nesting and wintering birds would be addressed and mitigated through the Ecological Mitigation and Enhancement Area. While this area and the other on-site enhancements are not likely to accommodate all of the skylark population from the Solar Site, and some may be displaced into the surrounding suitable farmland habitat, the residual effect is only considered to be at a **Site level** and therefore **Not Significant**.
- 10.9.3 Subject to the mitigation measures outlined being implemented, no other residual effects are anticipated on any designated sites, habitat or species during construction.

Operation

- 10.9.4 Adverse effects during operation would be avoided or reduced through inherent mitigation and industry standard methodologies, in addition to sensitive management measures employed during the operation phase via a LEMP. This can be secured through an appropriately worded planning condition.
- 10.9.5 The post-development landscaping, in particular the Ecological Mitigation and Enhancement Area, would reduce all potentially adverse effects during operation to **Negligible** levels. Indeed, the enhancement of retained habitats and creation of new habitats, and their long-term management, is predicted to result in a **Significant** long-term and reversible positive effect at the **Local level** for habitats including coastal floodplain and grazing marsh, hedgerows, trees, wet ditches, grassland and the on-Site pond.
- 10.9.6 The creation and establishment of new habitats, including the Ecology Mitigation and Enhancement Area, is also predicted to have a long-term positive effect on species including breeding birds, wintering birds, foraging/commuting bats, otter, water vole, and GCN. Due to a degree of uncertainty as to the extent of benefit for these species, they have been assessed on a precautionary basis as only positive at a Site level, which are therefore **Not Significant**. However, it is considered likely that significant positive effects could potentially be achieved.

Decommissioning

- 10.9.7 All decommissioning works would take into account the important IEFs and works will be carried out in accordance with their individual requirements to avoid significant impacts. Those avoidance and mitigation measures set out for construction work (as set out in a CEMP/ECMS) will also apply to decommissioning.
- 10.9.8 Subject to the mitigation measures being implemented, no significant residual effects are anticipated on any designated site, habitat or species during decommissioning. However, a degree of uncertainty is applied with respect to species, as this will be subject to the successful colonisation of the grassland on-site by certain protected species during the lifetime of the development (e.g. reptiles or GCN) and the extent of reversion back to arable land.



10.9.9 A long-term and reversible negative effect at the Site level, and therefore **Not Significant**, is anticipated for the two non-statutory designations within the Solar Site and the on-Site habitats, due to cessation of the sensitive management delivered through the LEMP and reversion to agricultural land.

10.10 Cumulative Effects

10.10.1 Committed and pre-application developments identified as requiring consideration with respect to cumulative effects include:

- Mona Offshore Wind Farm (reference EN010137) (consented in 2023) which includes construction of an onshore substation directly south of the Proposed Development's BESS Site. This project also includes broad areas within the Works Plans identified as temporary construction access and laydown areas and 2 x 400kV cables which cover parts of the BESS Site and adjacent land outside of the BESS Site. The Applicant has liaised with the developers of this project and following feedback the proposed BESS layout has been carefully designed so as to ensure there are no barriers to the construction and operation of this project, notably allowing sufficient space for the 400kV cables to the point of connection at Bodelwyddan substation;
- Awel y Mor Offshore Wind Farm (reference EN010112) (consented in 2025) which includes broad areas within the Works Plans identified as temporary construction access and laydown areas and 2 x 400kV cables which cover parts of the BESS Site and adjacent land outside of the BESS Site. The Applicant has liaised with the developers of this project and following feedback, the proposed BESS layout has been carefully designed to as to ensure there are no barriers to the construction and operation of this project, notably allowing sufficient space for the construction haul road running west-east across the BESS Site, linking with the Awel Y Mor laydown area adjacent to the west of the BESS Site;
- Land immediately north of A547 Rhuddlan Road Towyn Conwy (reference 0/40999) (consented in 2015) which comprises existing ground mounted photovoltaic (PV) solar arrays to provide 24MW generation capacity together with inverter buildings, internal maintenance access track, landscaping, fencing and ancillary infrastructure located immediately adjacent to the Site¹⁴⁸;
- St Asaph Solar (reference DNS CAS-01392-D2TSF3) comprising provision of photovoltaic solar farm and ancillary infrastructure located 5.5 km from the Solar Site; and
- Bodelwyddan Substation Extension (planning application not yet submitted) which involves the extension of the existing substation located immediately adjacent to the BESS Site. The proposed works will extend the substation into the northern part of the BESS Site, including the removal of boundary hedgerow and trees for its footprint. In addition, areas of the northern field of the BESS Site will be used temporarily for construction.

10.10.2 The cumulative assessment concludes that, through the adoption of appropriate mitigation measures, the Proposed Development would not give rise to any significant adverse residual effects on ecology, though a Site level not significant adverse effect on skylark is identified. The only one of the above projects which could have a cumulative impact with the Proposed Development is the St Asaph Solar site, due to its potential land take of suitable skylark habitat during construction. However, the impact to skylark from the Proposed Development is anticipated to occur at the Solar Site, which is approximately 5.5 km from this project. Given this spatial separation, no cumulative effect on skylark is likely to occur.

¹⁴⁸ This 2015 planning permission sits partially within this scheme's Solar Site. Only part of this approved development was constructed and the portion of the builtout area (currently operational) sits outside the Proposed Development's application red line. A northern section that was consented but not built out, however, sits within the Proposed Development's application redline. This permission was implemented and therefore remains extant in perpetuity. The remainder of the consented area could still be built out without the need for further planning approval.



- 10.10.3 The cumulative projects identified would also need to be designed to accommodate and mitigate ecological interests to fulfil planning policy requirements and thereby inherently protect ecological interests across the wider landscape from cumulative development impacts. However, this does not completely exclude the potential for insignificant effects to become significant in combination with other consented/proposed developments and associated infrastructure, on sensitive habitats, fauna, and flora.
- 10.10.4 The Bodelwyddan substation and two offshore wind farm projects' potentially cumulative impacts relate to their works at and around the BESS Site. Given that these projects' impacts are either temporary in nature (construction compounds), involve the installation of cables, or involve only small land-take (extension to the existing substation), coupled with the limited negative impacts from the BESS proposals at this part of the Site, and indeed a positive effect for habitats and likely species during the operational phase, no cumulative impacts with these schemes are anticipated.
- 10.10.5 In relation to the existing solar farm at Rhuddlan Road, owing to the small scale of this project and the Proposed Development's proposals for habitat creation and enhancements, including considerable new hedgerow proposed, including along the boundaries with this existing solar farm, no significant cumulative negative effects are anticipated.

10.11 Monitoring

- 10.11.1 It is anticipated that the LEMP would set out the monitoring regime for the enhanced and newly created habitats in order to achieve net benefits for biodiversity and compliance with the requirements of PPW. It is anticipated that this would entail monitoring of all habitats annually in years 1 to 5 and then at years 10, 20 and 30 thereafter in line with a review of the LEMP following establishment at year five. The monitoring would inform the need for remedial action. Any significant changes to the LEMP made as a result of the monitoring would be reported to the local planning authority to demonstrate continued compliance and the successful delivery of net benefits for biodiversity.

10.12 Consideration of Climate Change

- 10.12.1 Based on climate change projections, it is likely that there will be long term changes to climatic norms, including an overall increase in annual temperatures; hotter, drier summers; warmer, wetter winters and an increase in frequency and intensity of extreme weather events such as heatwaves, droughts, and heavy rainfall.
- 10.12.2 Given that the important habitats and species within the Site are widespread and the Site is not near the edge of any of their ranges, the projected change in temperatures is not anticipated to result in any significant impacts on the habitat and species identified as IEFs. However, to confirm that the newly created ponds and enhanced ditches assist with holding permanent wet areas for wildlife, they should be designed, where possible, to maintain areas of permanent water in line with climate change predictions.
- 10.12.3 Future monitoring of the new and retained habitats within the Site, as detailed within the LEMP and described above, would allow an opportunity for management prescriptions to be reviewed and amended to reflect any impacts as a result of climate change. This would further safeguard the habitat and species interests at the Site over the long-term.
- 10.12.4 Further consideration of climate change more generally is provided in Chapter 8.

10.13 Conclusions

- 10.13.1 This chapter provides an assessment of the significance and consequences of potential ecological effects upon identified IEFs arising from the Proposed Development. It has been undertaken by appropriately experienced ecologists with reference to CIEEM's best practice EIA guidelines (Updated 2024).



10.13.2 Further baseline information in support of this chapter is included within Appendix F.1: Ecological Baseline Report and is referred to throughout the assessment. The baseline survey work has identified the following IEFs pertinent to the Proposed Development:

- Statutory designations of International importance: Elwy Valley Woods SAC and The Dee Estuary SAC, SPA and Ramsar Site;
- Statutory designations of National importance: Coedydd ac Ogofau Elwy a Meirchion SSSI;
- Non-statutory designations of County importance: Abergele Grazing Marsh Wildlife Site (Candidate), Morfa Rhuddlan Wildlife Site (Candidate) and Coed Parc Kinmel (Candidate) Wildlife Site;
- Habitats of County importance: Priority Habitat coastal floodplain and grazing marsh, Priority Habitat wood-pasture and parkland, and adjacent ancient woodland;
- Habitats of Local importance: Priority Habitat native hedgerows and mature trees, wet ditches, and Priority Habitat pond (standing water);
- A wintering bird assemblage of County importance, with teal precautionarily considered up to International importance due to potential functional linkage with The Dee Estuary SPA/ Ramsar Site;
- Breeding bird assemblage, bat assemblage, otter, water vole, GCN and reptile populations of Local importance; and
- Badger presence of Site importance (included due to legal protection).

10.13.3 Primary and tertiary mitigation measures have been prepared through an iterative design process to address, where possible, any potential significant effects that may arise during construction, operation and decommissioning of the Proposed Development. Further measures to avoid, mitigate and compensate for all residual effects, in addition to enhancements recommended to enable the Proposed Development to deliver net benefits for biodiversity, are also presented.

10.13.4 The key inherent avoidance and mitigation measures incorporated as part of the Proposed Development's design includes:

- The retention and buffering of habitats of value within and adjacent to the Site including the vast majority of hedgerows (with 5 m buffer), wet and dry ditches (5 m buffer), main running water ditch along northern boundary of the Solar Site (10 m buffer), adjacent woodland (15 m buffer), other woodland (10 m buffer), mature trees (10 m buffer) and the onsite and immediately off-site ponds (30 m buffer);
- Utilising existing field access points where possible, and retention and buffering of the vast majority of the mature hedgerow and ditch network coupled with the creation of substantial additional hedgerows across the Site which will maintain and enhance connectivity for wildlife;
- The provision of suitable buffers (5 m from top of bank) from retained ditches supporting water vole populations;
- Retained habitats across the Site will no longer be intensively managed and instead will be enhanced and sensitively managed, including creation/enhancement of species-rich grassland across the Solar Site and BESS Site; and
- An Ecological Mitigation and Enhancement Area, totalling approximately 10 ha, has been designed within the proposals to provide enhancements for overwintering and ground nesting birds (specifically teal and skylark), with the creation of ponds, scrapes and a



rotation of bird crop/fallow land to provide enhanced year-round foraging and breeding opportunities. These habitats will also be of benefit to a range of other species including bats, badger, water vole, great crested newt and reptiles.

10.13.5 The key measures that will be implemented as a result of legislative requirements or standard practices include:

- Designated sites, habitats and species interests protected from construction impacts through the delivery of measures set out in a CEMP and ECMS. To inform these documents, an oCEMP and oECMS have been submitted with the application as **Appendix A.5** and **Appendix F.3**;
- A sensitive lighting strategy for the small extent of lighting required at the BESS Site, to avoid light spill on any retained and created habitats;
- To deliver net benefits for biodiversity and compliance with the requirements of PPW, mitigation measures in respect of new habitat creation/enhancement combined with prescriptions for their sensitive long-term management to enable continued functionality of the Site for wildlife will be embedded within a LEMP. To inform this document, an outline LEMP (oLEMP) has been submitted with the application as **Appendix F.4**; and
- At the end of the Proposed Development's lifespan, measures to deliver compliance with wildlife legislation, including the protection afforded to birds, bat, reptiles and amphibians under the Wildlife and Countryside Act 1981 (as amended) are to be set out within a decommissioning ECMS to be informed by updated surveys at that time, with mitigation under protected species licensing where required.

10.13.6 As a result of this sensitive design, compliance with wildlife legislation and implementation of mitigation via a CEMP and ECMS, no significant effects are anticipated during construction, with negative effects at up to a Site level only (and therefore not significant) anticipated for on-site non-statutory designated sites, some habitats comprising coastal floodplain and grazing marsh, wood-pasture/parkland and native hedgerows/mature trees, and some species comprising habitat loss for skylark, disturbance to breeding and wintering birds, and habitat loss for GCN. Positive effects at up to a Site level only (and therefore not significant) are anticipated for breeding and wintering birds owing to the provision of the Ecological Mitigation and Enhancement Area. All other potential construction effects are considered to be Negligible.

10.13.7 With implementation of sensitive habitat management and species enhancement measures delivered through the LEMP, whilst no potential effects are anticipated on statutory and non-statutory designated sites during operation of the Proposed Development, and Negligible operational effects upon roosting bats and badger, positive effects precautionarily considered at a Site level (and therefore not significant) are concluded for breeding birds, wintering birds, foraging/commuting bats, otter, water vole, GCN and reptiles. An overall net benefit to biodiversity is therefore anticipated during operation of the Proposed Development.

10.13.8 The reversion of the Site from grassland back to pasture and arable habitats as part of decommissioning could result in a negative effect at up to a Site level (and therefore not significant) on the on-site non-statutory designations and other on-site habitats, although effects are anticipated to be Negligible for statutory designations and species. However, this will be subject to the value of the habitats established, colonisation by species and scale of reversion, which remains uncertain at this stage.

10.13.9 No cumulative effects arising in combination with other consented or proposed schemes in the wider landscape are anticipated owing to the nature of the proposals and their spatial separation from the Site.

10.13.10 Based on the Ecological Impact Assessment and consideration of the IEFs, it is concluded that the Proposed Development would conform to the legislative protection afforded to these IEFs and with national and local planning policy requirements relating to biodiversity



10.14 Non-Technical Summary

Introduction

10.14.1 The Environmental Dimension Partnership Ltd (EDP) has assessed the potential ecological effects that the Proposed Development may have on the Site and its surroundings. The assessment included a review of the current conditions found within the area and identifies measures to avoid, mitigate and/or compensate, where appropriate, for significant ecological effects that may arise as part of the proposals.

Baseline Conditions

10.14.2 The Site comprises three components, namely:

- The Solar Site (location of proposed solar panel arrays), comprises predominantly intensively managed farmland (sheep and cattle pasture and arable) enclosed by hedgerows and field ditches, with parts designated as coastal floodplain and grazing marsh;
- The Battery Energy Storage System (BESS) Site component is located south of St Asaph Business Park and comprises intensively managed farmland (sheep pasture) enclosed by hedgerows; and
- A Cable Corridor, c. 8km in length and 10m in width passes through farmland, woodland and wood pasture and parkland, utilising existing roads and tracks where available to avoid impacts on trees, before running along the Glascoed Road (B5831).

10.14.3 Owing to the habitats present on and adjacent to the Site, in addition to a desk study and habitat assessment, detailed surveys were undertaken for hedgerows, breeding birds, wintering birds, roosting bats, foraging/commuting bats, otter, water vole, badger and great crested newt (GCN) to determine the Site's importance for wildlife.

10.14.4 The Site is considered to be of relatively low to moderate ecological value with several designated site, habitat and protected or notable species identified during the ecological investigations requiring further consideration. There are a few statutory designated nature conservation sites (sites receiving legal and planning policy protection) in proximity to the Site, with only the designations at The Dee Estuary considered to be a risk of effects relating to the wintering teal population for which the conservation site is designated. In addition, there are three non-statutory designated nature conservation sites (sites receiving planning policy protection only) within the Site itself; Abergele Grazing Marsh (Candidate) Wildlife Site and Morfa Rhuddlan (Candidate) Wildlife Site and within the Solar Site and the Cable Corridor passes through Coed Parc Kinnel (Candidate) Wildlife Site.

10.14.5 The habitats of value within and immediately adjacent to the Site comprise the coastal floodplain and grazing marsh within the Solar Site, the network of native hedgerows, mature trees and wet ditches, the single pond within the Solar Site, wood-pasture and parkland that the Cable Corridor passes through and ancient woodland that lies adjacent to the Solar Site and parts of the Cable Corridor.

10.14.6 With respect to species at the Site, the wintering bird assemblage is generally of County ecological importance, but notable numbers of teal recorded are precautionarily assessed of up to International ecological importance due to potential association with the nearby Dee Estuary designated sites. The populations of breeding birds, bat roosting features, foraging/commuting bats, otter, water vole, GCN and reptiles are of Local ecological importance, whilst badger presence is of Site ecological importance.

Construction and Operation Effects



Environmental Statement

- 10.14.7 Through an iterative design process, the proposals have sought to retain and protect the key designation, habitat and species interests, thereby avoiding the risk of any significant effects arising. The network of retained and buffered habitats will also be enhanced through appropriate management measures to strengthen connectivity to surrounding habitats and safeguard these habitats for protected species. In addition to the strengthening of existing boundary habitats through supplementary planting and sensitive management, this would include: the creation of considerable length of new hedgerows; restoration of ditches including wetting of dry ditches where possible (subject to consultation with NRW and any necessary consents), new tree planting; enhancement of the on-site pond and creation of meadow grassland across the Solar Site and around the equipment at the BESS Site.
- 10.14.8 Furthermore, an Ecological Mitigation and Enhancement Area, totalling approximately 10 ha, has been designed within the proposals to provide enhancements for overwintering and ground nesting birds (specifically teal and skylark), with the creation of ponds, scrapes and a rotation of bird crop/fallow land to provide enhanced year-round foraging and breeding opportunities. These habitats will also be of benefit to a range of other species including bats, badger, water vole, great crested newt and reptiles.
- 10.14.9 Bird, bat, otter, water vole, badger, reptile and GCN interests would be further protected through sensitive working methodologies and opportunities for these species enhanced through measures such as the installation of mammal gates, erection of barn owl boxes, potential wetting of some dry ditches and creation of permanently wet water bodies.
- 10.14.10 In light of this, the only significant residual effect is considered to be a long-term positive effect significant at the Local level for habitats.

Decommissioning

- 10.14.11 Habitats and species interests will be protected during decommissioning as they are during construction with measures such as the use of Ecological Protection Zones, sensitive timing of works and ecological supervision. This will be informed by update species surveys as advised by an ecologist.
- 10.14.12 Some uncertainty remains around whether any significant negative effects will arise during decommissioning as this may depend on the extent of reversion from the enhanced habitats provided back to pasture and arable land, and also the successful colonisation of the new and enhanced habitats on-site during the lifetime of the Proposed Development.

Cumulative Effects

- 10.14.13 Owing to the lack of negative effects from the Proposed Development in addition to the spatial separation and nature of other application sites within the wider landscape, alongside their need to meet legislative and policy requirements relating to wildlife, no cumulative effects are anticipated.

Conclusions

- 10.14.14 In light of the above, there is no evidence to suggest that the Proposed Development, with the use of appropriate safeguards, mitigation and enhancements, would lead to any significant negative effects on any known protected species or ecological features of value. Indeed, the Proposed Development is anticipated to create and enhance opportunities for wildlife, thereby delivering a net benefit for biodiversity and being in accordance with local and national planning policy.



10.15 References

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11 Landscape and Visual Impact

11.1 Introduction

11.1.1 This Chapter of the Environmental Statement (ES) assesses the likely significant landscape and visual effects of the Proposed Development. It considers how construction, operation and decommissioning of the Proposed Development would potentially affect landscape character such as host and non-host character areas, local and national landscape designations, as well as the perceptual and physical attributes of the landscape. Visual amenity is also considered with visual receptors such as road users, residents and recreational users of rights of way and designated landscapes assessed within the zone of visual influence. The assessment is based on the characteristics of the Site and surrounding area, as well as the key parameters of the Proposed Development detailed in **Chapter 3 – Site and Development Description**.

11.1.2 This Chapter is supported by a number of appendices, which should be read alongside this LVIA as follows:

- **Appendix G.1:** LVIA Baseline;
- **Appendix G.2:** LVIA Methodology;
- **Appendix G.3:** Schedule of Effects Tables; and
- **Appendix G.4:** Residential Visual Amenity Assessment.

11.1.3 This Chapter has been prepared by Landscape Architects at The Environmental Dimension Partnership Ltd (EDP), a Registered Practice with the Landscape Institute and a corporate member of the Institute of Environmental Management and Assessment (IEMA). In accordance with Regulation 17(4)(b) of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in Appendix G.4.

11.2 Policy Context, Legislation, Guidance and Standards

11.2.1 This section identifies the legislation, planning policy and technical guidance that has informed the assessment of effects with respect to the LVIA. Further information on policies relevant to the Project is provided in Chapter 6: Planning and Policy Context.

Legislation

11.2.2 A summary of the relevant legislation is given in **Table 11.1**.



Table 11.1: Legislation Relevant to the LVIA

Legislation	Legislative Context
Well-being of Future Generations (Wales) Act 2015 ¹⁴⁹	The Act puts in place seven well-being goals to help public bodies work towards the same vision of a sustainable Wales. In relation to landscape matters, the most relevant well-being goal is the achievement of 'a resilient Wales', which seeks to maintain and enhance a biodiverse natural environment. <i>Planning Policy Wales, Edition 12</i> (PPW) recognises that this goal can be supported by protecting sufficient scales, extent and connectivity of, and between, landscapes and habitats to enable them to withstand the pressures of change and protect and enhance biodiversity and to promote opportunities for social and economic activity based on valuing and enabling access to the natural, historic and built environment.
Environment (Wales) Act 2016 ¹⁵⁰	This Act requires, under Section 6 – Biodiversity and resilience of ecosystems duty, that a public authority must seek to maintain and enhance biodiversity and promote the resilience of ecosystems. This requirement could be interpreted to include landscape as part of the ecosystems approach.
National Parks and Access to the Countryside Act 1949 ¹⁵¹	This Act provides the framework for the creation of National Parks and National Landscapes (previously Areas of Outstanding Natural Beauty), including the Clwydian Range and Dee Valley National Landscape which lies within the LVIA Study Area. The statutory purpose of National Landscapes is to conserve and enhance their natural beauty, while having regard to the needs of agriculture, forestry, wildlife conservation and the economic and social well-being of local communities. The relevant Management Plan ¹⁵² promotes climate change adaptation, public understanding and enjoyment of its special qualities.

Planning Policy

- 11.2.3 A summary of the relevant national and local planning policy is set out at **Appendix G.1** and these policies are summarised in **Table 11.2**.

Table 11.2: Planning Policy Relevant to the LVIA

Policy	Policy Context
National Planning Policy	
Future Wales: The National Plan 2040 ¹⁵³	Set out the strategic direction for all scales of planning and sets out policies and key issues to be considered. Policy 17 and 18 are most pertinent to the Proposed Development. Criteria 1 of Policy 18 states that renewable and low carbon energy projects qualifying as Development of National Significance (DNS) will be permitted where the Proposed Development does not have unacceptable adverse impacts on the surrounding landscape (particularly on the setting of National Landscapes). Criteria 2 of Policy 18 states that permission will be granted where there are no unacceptable adverse visual impacts on nearby communities and individual dwellings.
Local Planning Policy	

¹⁴⁹ National Assembly for Wales. (2015). Well-being of Future Generations (Wales) Act 2015. (Online). Available at: <https://www.legislation.gov.uk/anaw/2015/2>

¹⁵⁰ Welsh Government. (2024). Planning Policy Wales, Edition 12. (Online). Available at: <https://www.gov.wales/sites/default/files/publications/2024-07/planning-policy-wales-edition-12.pdf>

¹⁵¹ Parliament of the United Kingdom. (1949). National Parks and Access to the Countryside Act 1949. (Online). Available at: <https://www.legislation.gov.uk/ukpga/Geo6/12-13-14/97/contents>

¹⁵² AONB Joint Committee/Partnership led by Denbighshire County Council. Clwydian Range & Dee Valley AONB Management Plan (Online) Available at: <https://www.clwydianrangeanddeevalleyaonb.org.uk/wp-content/uploads/2024/09/Management-Plan-EN.pdf>

¹⁵³ Welsh Government (2021). *Future Wales: The National Plan 2040*. Published 24 February 2021. (Online). Available at: <https://www.gov.wales/future-wales-national-plan-2040>



Policy	Policy Context
The Conwy Local Development Plan 2007 – 2022 (adopted October 2013) ¹⁵⁴	NTE/4: The Landscape and Protecting Special Landscape Areas (SLAs) - Protects designated SLAs; development must conserve/enhance character; NTE/3: Biodiversity - Requires development to conserve/enhance biodiversity and landscape features; and DP/3: Promoting Design - Encourages high-quality design that respects local landscape and visual context.
The Denbighshire Local Development Plan 2006 - 2021 (adopted June 2013) ¹⁵⁵	RD 1: Sustainable Development and Good Standard Design - Sets out criteria to ensure new development conserves/enhances local character, respects landscape and townscape context, and integrates well with its surroundings; VOE 1: Key Areas of Importance - Safeguards the natural environment, biodiversity, landscape character, and historic environment from inappropriate development; VOE 2: Area of Outstanding Natural Beauty (AONB) (now referred to as National Landscapes) and Area of Attractive Landscape (AAL) - Protects nationally and locally designated landscapes (including the Clwydian Range and Dee Valley National Landscape; development must conserve/enhance scenic quality; and VOE 10: Renewable Energy Technologies - Supports appropriate renewable energy proposals while protecting landscape, residential amenity, biodiversity, and cultural heritage.
Planning Policy Wales	
PPW, Edition 12	Sets out the planning policy framework for Wales with the overall objective to ensure that the planning system contributes towards the delivery of sustainable development. For landscape, this chiefly involves principles of maximising environmental protection and limiting environmental impact, while safeguarding the landscape as a resource and enhancing resilience to climate change.

11.2.4 The main guidance documents used to inform the assessment and methodology for this chapter are:

- *Guidelines for Landscape and Visual Impact Assessment - Third Edition (GLVIA3)* (Landscape Institute, Institute of Environmental Management & Assessment, 2013);
- Using LANDMAP in Landscape and Visual Impact Assessments Guidance Note 46, Natural Resources Wales (2013);
- Designing Renewable Energy in Wales, Design Commission for Wales (2023);
- An Approach to Landscape Character Assessment (Natural England, 2014);
- Residential Visual Amenity Assessment (RVAA) - Technical Guidance Note 2/19: Landscape Institute (15 March 2019);
- Landscape Institute Technical Guidance Note (TNG) 06/19 Visual Representation of Development Proposals (Landscape Institute, 2019); and

¹⁵⁴ **Conwy County Borough Council (2013).** *Conwy Local Development Plan 2007 – 2022*. Adopted October 2013. (Online). Available at: <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Assets-written-proposals-maps/Conwy-Local-Development-Plan-2007-2022.pdf>

¹⁵⁵ **Denbighshire County Council (2013).** *Denbighshire Local Development Plan 2006 – 2021*. Adopted June 2013. (Online). Available at: <https://www.denbighshire.gov.uk/en/documents/planning-and-building-regulations/ldp/adopted-ldp/adopted-local-development-plan-2006-2021.pdf>



- Supplementary Planning Guidance (SPG): Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (Denbighshire County Council (DCC), 2018).

11.3 Consultation

- 11.3.1 The Bodelwyddan Solar and Energy Storage Environmental Impact Assessment (EIA) scoping report was submitted to Planning and Environment Decisions Wales (PEDW) under Regulation 33 of the 2017 Regulations (Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017) in December 2024. The opinions of statutory consultees such as the Welsh Government, the host Local Planning Authorities (LPAs), Cadw, and Natural Resources Wales (NRW) was sought through this formal consultation processes. An EIA scoping direction (Document reference DNS CAS-03950-F9K3T4 Bodelwyddan BESS (Battery Energy Storage System) and Solar Farm) was issued by PEDW on behalf of Welsh Ministers in February 2025 which confirms the scope of the ES required for the Proposed Development.
- 11.3.2 In response to NRW’s comments received in letter dated 03 February 2025, study areas were increased and additional views from Offa’s Dyke and the Clwydian Range and Dee Valley National Landscape (CRDVNL) have been incorporated (including views from Moel Hirradug and Offa’s Dyke). Additional views of the BESS Site have also been added. Visualisations have been provided from eight photoviewpoint locations. LANDMAP visual and sensory aspect area evaluations have been provided at all viewpoints also.
- 11.3.3 The landscape effects on SLAs and National Landscapes increased from 7km to 10km in response to consultation comments.
- 11.3.4 In response to DCC’s comments, the Study Area of the RVAA was increased to 1km. The cumulative sites they suggested were also included.

11.4 Methodology

Study Area

- 11.4.1 Through the consultation process, a broad Study Area of 10km was agreed with the LPA. The extent of the Study Area for both landscape and visual receptors was determined through a combination of baseline data review, statutory consultation and site visits between November 2024 and April 2025. NRW Guidance Note 46 was also considered to inform the selection of an appropriate Study Area. Zone of Theoretical Visibility (ZTV) mapping was initially produced using bare earth modelling to identify the likely extent of visibility. This was subsequently refined by incorporating the screening effects of existing built form and vegetation. LiDAR 1m Digital Surface Modelling was used to create the ZTVs.
- 11.4.2 Lastly, following a more detailed review of guidance notes, analysis and the scoping direction, a tiered study area approach has been set out to assess landscape character and visual amenity. The breakdown of the tiered approach, in accordance with guidance is set out in **Table 11.3** below:

Table 11.3: Study Areas for the LVIA

Zonal Groups/Main Elements for Consideration	Study Area
International/National Landscape Designations with very high sensitivity: Clwydian Range and Dee Valey National Landscape and Promoted Routes. Visual receptors with very high sensitivity (publicly accessible locations from these designations).	10km
Visual Receptors - with high to low sensitivity: minor roads, Public Right of Way (PRoW), country parks etc.	10km



Zonal Groups/Main Elements for Consideration	Study Area
LANDMAP Aspect Areas: Cultural, Landscape Habitats and Geological.	Host areas within the Site boundary
LANDMAP Aspect Areas: Visual and Sensory overlapping with a photoviewpoint and within the ZTV.	10km
Residential Visual Amenity Assessment: Residential Receptors within 1km of the Site boundary and within the ZTV.	1km
Cumulative LVIA: Includes committed development and sites in scoping, in planning and consented.	10km

Baseline Data Collection

11.4.3 The Baseline report provided at Appendix G.1 sets out the list of landscape and visual receptors identified for consideration in the assessment. A summary of the primary organisations that have supplied data, together with the nature of that data is outlined in **Table 11.4**.

Table 11.4: Primary organisations and data provided

Primary Organisations	Data type	Data Provided
Ordnance Survey (OS)	Scale 1:50,000 and 1:25,000 mapping as appropriate	Baseline information on the landscape context including topography, drainage, settlement pattern, land use, tree cover, promoted recreational routes, transport network and infrastructure.
Google Earth Pro	Aerial photography (imagery date July 2025) and Street View	Baseline information and Street View images on the landscape context including drainage, settlement pattern, land use, tree cover, transport network and infrastructure.
NRW	LANDMAP Aspect Areas (AA): Geological Landscape (GLAA), Landscape Habitats (LHAA), Visual and Sensory (VSAA), Historic Landscape (HLAA) and Cultural Landscape (CLAA) GIS dataset and evaluations	Baseline information on landscape character in Wales, recorded and evaluated in a nationally consistent data set.
Denbighshire County Council and Joint Unit for Clwydian Range and Dee Valley National Landscape	Clwydian Range & Dee Valley AONB Management Plan Review 2020-2025	Set out Management plan and Special Qualities of the Clwydian Range and Dee Valley National Landscape (CRDVNL).
Datamap.gov.wales	Datasets of SLAs	Spatial boundaries provided.
Sustrans	National Cycle Routes	Provides details of the National Cycle Routes within the LVIA Study Areas.



Primary Organisations	Data type	Data Provided
OS	Address Base Core	Residential Addresses within the Study Area.

11.4.4 In addition to this, the Sites for consideration in the Cumulative Assessment have been provided at **Table 11.5**.

Table 11.5: Cumulative Sites and Committed Development list

Site Address and Application Reference Number	Description	Status	Distance from Site
Land immediately north of A547 Rhuddlan Road Towyn Conwy. Ref: 0/40999	Installation of ground mounted photovoltaic (PV) solar arrays to provide 24MW generation capacity together with inverter buildings, internal maintenance access track, landscaping, fencing and ancillary infrastructure.	Consented	Adjacent to the Solar Site
Awel y Mor Offshore Wind Farm Ref: EN010112	Wind farm and associated development.	Consented	Partially overlaps with the BESS Site (note – relating to underground cabling/utilities and temporary construction access and laydown areas)
Mona Offshore Wind Farm EN010137	Wind farm and associated development.	Consented	Partially overlaps with the BESS Site (note – relating to underground cabling and temporary construction access areas)
St Asaph Solar Farm Ref: DNS CAS-01392-D2TSF3	Ground-mounted solar PV scheme (~18.4 MW) with associated infrastructure.	In Scoping	Approximately 800m south east of the BESS Site
Land Adjacent to Maes Owen, Abergele Road, Bodelwyddan, Rhyl, Denbighshire Ref: 40/2024/1079/PF	Erection of 49 affordable dwellings, roads, footpaths, open space, landscaping, drainage, and a pumping station.	Consented	c.500m south-east of the Solar Site
Land at Bryn Morfa, Bodelwyddan, Rhyl, Denbighshire Ref: 40/2023/0627	Demolition of an existing dwelling and erection of 31 affordable homes, access roads, and associated works.	Consented	c.600m south-east of the Solar Site

Limitations

11.4.5 There are no limitations relating to LVIA that affect the robustness of the assessment of the potential likely significant effects of the Proposed Development. However, access restrictions to certain private dwellings were noted during the RVAA, which limited detailed visibility assessment at those specific locations. This limitation is not considered to materially affect the overall conclusions of the LVIA.



11.5 Baseline Conditions

The Site and Surrounding Area

- 11.5.1 A detailed description of the landscape at the Site is provided in Appendix G.1 and there are supporting Figures which illustrate the topographical relief, Site character and environmental considerations.
- 11.5.2 In summary, the Site comprises the Solar Site, the BESS Site and the connecting c.8km Cable Corridor. The overall Site boundary for the Proposed Development measures circa 183.77ha.
- 11.5.3 The Solar Site comprises a series of low-lying, flat agricultural fields covering approximately 168.95ha and is dissected by the A547/Rhuddlan Road, Gors Road, St George, and an unnamed road south of St Asaph Avenue. Boundaries are defined by hedgerows and ditches (both wet and dry), with fencing common throughout, while some boundaries, such as the northern extent of the Site, are open or marked only by ditches and low fencing. Landscape features within the Site are limited, consisting mainly of ditches and hedgerows of varying quality. A stone wall forms part of the boundary with Rhuddlan Road and St George. Trees on and within the Site are sparse.
- 11.5.4 The surrounding area is also low lying with little variation in landform found within a minimum of 600m radius from the Solar Site. In the immediate context of the Solar Site there are adjacent residential properties, the Kinmel Solar Park, Gofer Bulking Station, Rhuddlan Road and Gors Road. There is also a public footpath, PRoW 31/12 which runs adjacent to the eastern site boundary. The Site itself is removed from the settlement. An operational solar farm is located adjacent to the Site boundary. This establishes a precedent for renewable energy development of similar scale and form within the local landscape.
- 11.5.5 In terms of LANDMAP host Visual and Sensory Aspect Areas (VSAA): the Abergele Coastal Plain, Coastal Fields-near Towyn and Area North and East of Bodelwyddan all host the Solar Site. The area containing the Solar Site is a transition zone, and this is evidenced by the east-west arterial road routes that link the north coast. The integrity of the green infrastructure is noted as in poor condition and the lack of management presents an opportunity for future development to improve the character as well as biodiversity.
- 11.5.6 In terms of landscape value, nothing exceptional was identified in the LANDMAP review or in the assessment of landscape value carried out in Appendix G.1. There is no public access such as rights of way that traverse the Solar Site, and the footpath network is sparse in the vicinity of the Solar Site.
- 11.5.7 The BESS Site comprises two fields with no public access permitted, and the boundaries of the BESS Site include some trees of note. Hedgerows border most edges, except for the northern edge, but this is bound by woodland off site which encloses and separates the BESS Site from St Asaph Business Park. The National Grid Bodelwyddan substation is a notable piece of energy infrastructure adjacent to the north-east boundary. In addition, overhead lines transect the south-eastern part of the BESS Site. There is one residential property in proximity to the north-western edge.
- 11.5.8 Regarding landscape character, the BESS Site lies within the Cefn Estate, and the findings are consistent with its scenic value. The local context, however, is strongly influenced by industrial development, reducing the Site's sensitivity.
- 11.5.9 The Cable Corridor for the underground cables comprises an c.10m wide and c.8km in length easement predominantly through Kinmel Park and Glascoed Road. The Cable Corridor overlaps with mineral safeguarding area for limestone, however there are no adverse impacts on any mineral resources as concluded in the submitted *Mineral Resource Assessment*. Sensitive receptors along the Cable Corridor include veteran trees, however as set out in the submitted Arboricultural Impact Assessment (report reference: edp8841_r007a).



Baseline Evolution

- 11.5.10 Considering a 'no development' scenario and a continuation of the intensive farming practices on going at present, there would be limited long-term management or improvements to the field pattern or existing habitats on-site. The character of the Site may remain or possibly degrade as the landscape is unlikely to be managed for biodiversity, nature conservation or climate change adaptation and resilience. It is therefore possible that, in the absence of the Proposed Development and the landscape management strategies proposed herein, the condition of the habitats currently present and their suitability to support protected and priority species would slowly deteriorate.
- 11.5.11 Climate change could significantly alter the character of an intensively farmed floodplain landscape from storm damage, to crop failure and drought. The Solar Site already shows signs of degradation like defunct hedgerows and poor-quality landscape features. Altered land use may be possible in the future as well as more waterlogged areas which could render parts of the flood plain unsuitable for intensive agriculture in any event. A shift towards more wetland compatible uses may prevail which would provide more variation in terms of character and biodiversity opportunity. Flood defence structures may be introduced which could change the character and appearance of the wider area also. It is possible that rewilding or restoration projects are rolled out on a large scale within such water catchment areas in an effort to restore wetland functions or reintroduce natural features (e.g., riparian vegetation, reed beds), potentially transforming the current character from intensive farmland to a semi-natural or more ecologically functional landscape.

11.6 Primary and Tertiary Mitigation

- 11.6.1 The Proposed Development would have a construction phase of circa 12-24 months and an operational period of up to 40 years and all components of the Proposed Development are fully reversible with the exception of the Landscape and Ecology Strategy which includes habitat creation and enhancement measures to be managed in for the duration of the Proposed Development.
- 11.6.2 The Proposed Development has been designed to incorporate both types of mitigation throughout its lifecycle, particularly with respect to landscape and ecological integration. The Proposed Development has integrated primary mitigation measures through design-led, landscape-scale enhancements that reduce effects and build climate resilience. Tertiary mitigation is largely based on good practice and regulatory compliance such as PPW requirements which supports the delivery and long-term environmental performance of the Proposed Development. Together, these measures will help deliver a multifunctional and ecologically valuable landscape, minimising adverse effects during construction and operation. Specific measures with respect to those anticipated during construction and at operation are discussed below in respect to landscape and visual impact.

Primary Mitigation

- 11.6.3 **Primary mitigation** refers to measures embedded into the design of a development to avoid or reduce adverse effects from the outset.

Construction

- 11.6.4 An approved ECMS will require that all necessary protocols, checks, and precautionary measures are followed during construction. Landscape features on and adjacent to the Site will be protected to prevent damage from machinery. Weather and ground conditions will be monitored so that construction activities are undertaken when the Site is not waterlogged, avoiding compaction and degradation of the fields.



Operation

- 11.6.5 The Proposed Development has been designed to minimise visual impacts, with the layout of the solar array reduced in places to set back development from residential receptors in proximity to the Site boundary. In addition, the placement of inverters and ancillary equipment has been moved away from both residential receptors and roads to areas where distant views from the CRDVNL can be easily mitigated by adjacent woodland to remove the visual impact completely (placing equipment to the west of adjacent woodland), and to provide a wooded backdrop to reduce the visual effects where such equipment would be located to the east of adjacent woodland.
- 11.6.6 The Proposed Development has been sited within existing field parcels, on intensively farmed land to avoid high-value habitats and sensitive ecological corridors. Internal networks and hedgerows are retained and enhanced where logical, limiting land take and helping to maintain and improve baseline character. Existing field breaks have been prioritised to accommodate access tracks.
- 11.6.7 In terms of adjacent landscape features, built form has been offset from ditches, hedgerows and woodland to allow adequate buffers for future management. The majority of Site accesses are existing, with a single new vehicle access proposed for the Solar Site to facilitate the development while minimising vegetation removal. The landscape strategy identified ditches that would benefit from enhancement. In areas of the Site boundary where vegetation is absent, the strategy includes the planting of new native species-rich hedgerows and hedgerow trees to strengthen the Green Infrastructure Network within the Site and the surrounding context.

Tertiary Mitigation

- 11.6.8 **Tertiary mitigation** involves measures that are typically standard practice or regulatory requirements used to manage residual impacts during and after project implementation. A CEMP is an example of such measures (which is proposed to be secured by way of a planning condition), and an oCEMP accompanies this application (**Appendix A.5**).

Construction

- 11.6.9 British Standards relating to fencing, tree protection, new tree and hedgerow planting etc. will be adhered to during construction.

Operation

- 11.6.10 As part of standard regulatory compliance and in accordance with the PPW, the Proposed Development includes replacement planting for any tree removal required to facilitate the Proposed Development, alongside enhancement measures that support a net benefit for biodiversity. Long-term management plans will be provided in accordance with PPW. Maintenance of new habitats, such as hedgerows and meadows, will maintain their function and ecological benefits, fulfilling regulatory biodiversity obligations. An outline Landscape and Ecology Management Plan (oLEMP) accompanies this application, and a detailed Landscape and Ecology Management Plan (LEMP) can be secured by a suitably worded planning condition to set out planting schedules for planting native trees and hedgerows and methods of grassland enhancement.

11.7 Assessment of Significant Likely Effects

- 11.7.1 An assessment of effects has been undertaken within Appendix G.3: Schedule of Effects Tables (report reference edp8841_r010) with support from Appendix G.1: LVIA (report reference: edp8841_r005). A summary of the findings of the assessment tables are detailed below. The RVAA is contained at Appendix G.4.



- 11.7.2 The terms 'Sensitivity', 'Magnitude of Change', 'Level of Effect', and 'Significance' are defined within Appendix G.2: LVIA Methodology.

Construction Phase

Construction: Landscape Character

- 11.7.3 During construction, the landscape and visual effects would arise from temporary activities such as groundworks, the formation of access tracks, fencing, temporary compounds, and the installation of infrastructure. Landscape and visual direct and indirect effects resulting from the construction stage would be temporary and short-term.
- 11.7.4 The following landscape receptors have been assessed during construction in Appendix G.3: Schedule of Effects Tables, Section 2:
- Site Character: assessed separately for the Solar Site and BESS Site and proposed cabling;
 - National Landscape Character Area: (NLCA) 8 - North Wales Coast;
 - Host LANDMAP Aspect Areas: Visual and Sensory, Historic Landscape, Landscape Habitats, Geological Landscape, and Cultural Landscape for each Site;
 - Non-host Visual and Sensory Aspect Areas: within 3km and 3-10km of both the Sites; and
 - Designated Landscapes: Betws yn Rhos SLA and the CRDVNL.
- 11.7.5 During construction, the greatest landscape effects would occur within the Site itself, where the introduction of machinery, temporary fencing, access tracks and earthworks and the removal of vegetation to facilitate the underground cabling and access tracks would result in a high magnitude of change. As such, effects on the character of the Solar Site and BESS Site are assessed as moderate adverse and significant and the BESS Site major/moderate adverse and significant, although they would be temporary in nature.
- 11.7.6 During construction, trees to be retained would be protected in accordance with those measures outlined within the Arboricultural Impact Assessment (report reference: edp8841_r007). Whilst some trees/hedgerows would be lost as a result of the Proposed Development, no additional tree stock would be lost due to construction practices. Trees to be removed are limited in number and would not adversely affect the integrity and continuity of the landscape infrastructure. Additionally, a large quantity of new tree, hedgerow and woodland planting will take place in line with the Illustrative Landscape and Ecology Strategy (**Figure 11.8**). This will result in an overall net gain in the tree and hedgerow stock, which will enhance the amenity and ecological value of the Site, improve diversity of species and age, and secure succession of the tree stock into the future.
- 11.7.7 The proposed Cable Corridor will be installed within a 10m wide working corridor included in the Site boundary. Of this, approximately 750mm will be directly disturbed for the cable trench itself, with the remaining width providing working room and access. Installation will involve temporary ground disturbance, followed by full reinstatement and remediation of the working corridor to its original land use and condition. As such, construction is not expected to result in a permanent alteration to the character of the land crossed. The Cable Corridor avoids the removal of trees and hedgerows where possible; where crossings are necessary, trenchless techniques (such as directional drilling) are anticipated to allow passage beneath root protection areas and avoid direct impacts. These methods, and the careful routing of the Cable Corridor, are intended to prevent harm to landscape features and retain the integrity of field boundaries. Subject to adherence to the arboricultural constraints and construction method statements, effects on-site character from the cable installation are therefore anticipated to be of low magnitude, temporary in duration, and not significant.



- 11.7.8 Effects on the wider NLCA 8: North Wales Coast would be limited to a very small proportion of the overall character area. Given the scale, low-level and location of the Proposed Development, the magnitude of change is assessed as low, resulting in a moderate/minor adverse effect which is not considered significant.
- 11.7.9 Within the host LANDMAP aspect areas for both the Solar Site and BESS Site, the magnitude of change is typically low to negligible. Visual and Sensory and Historic Landscape aspect areas would experience low magnitude changes resulting in moderate/minor adverse effects, while Landscape Habitats and Geological Landscape would experience low magnitude changes resulting in minor adverse effects. Cultural Landscape effects are negligible. In all cases, the level of effect is not considered significant.
- 11.7.10 Effects on non-host Visual and Sensory Aspect Areas within 3km of the Site would also be limited, with low magnitude changes resulting in minor to moderate/minor adverse effects. For non-host areas between 3km and 10km, the magnitude of change is very low. Although these receptors have medium - very high sensitivity, the overall effects are considered not significant, in accordance with Paragraph A1.29 of the LVIA methodology, as changes would be barely perceptible and would not materially alter landscape character.
- 11.7.11 Effects on designated landscape receptors would similarly be limited. Within the Betws yn Rhos SLA, a very low magnitude of change would result in a moderate/minor adverse effect, which is not significant. For the CRDVNL, although the receptor is of very high sensitivity, any indirect change would relate to views of construction activity which would be seen at a considerable distance, occupying a very small portion of the view and appearing within a settled and visually complex lowland context. The Proposed Development would not affect the distinctive upland character, landform, or special qualities of the CRDVNL, such as openness or remoteness. The magnitude of change is assessed as very low to negligible, resulting in a moderate adverse to no effect, which is considered not significant in EIA terms, applying professional judgement as per Paragraph A1.29 of the LVIA methodology.

Construction: Visual Receptors

- 11.7.12 The following visual receptors have been assessed during construction in Appendix G.3: Schedule of Effects Tables (Section 3 and 4):
- Road and PRoW users represented by Photoviewpoints (PVPs) 1-3, 4-9, 12-13, and 20-22;
 - Elevated PRoW and recreational viewpoints within CRDVNL represented by PVPs 14, 18-19, and 24-29; and
 - Overall receptors at PVPs 1-7, 10, 12-14, 19, 21-22, 26-26a, 29 experience moderate, adverse effects or higher which are **significant**.

Visual Effects on Receptors Within 600m of the Site

- 11.7.13 Within 600m of the Site, PRoW and road users experience varying levels of visual effects during construction, influenced by their sensitivity and proximity. Road users at PVPs 1, 2, 3, and 5, are low sensitivity receptors and experience a high magnitude of change due to close-range views of construction activities, including solar panel installation and vehicle movements. This leads to a moderate adverse level of effect reflecting noticeable alterations to key landscape features, albeit temporary in nature.
- 11.7.14 Medium sensitivity road users at PVP 6 experience a similarly high magnitude of change, resulting in a major/moderate adverse effect given their proximity and views of construction operations. Road users at PVP 7 experience a medium magnitude of change, which leads to a moderate adverse effect, reflecting partial visibility and slightly reduced exposure.
- 11.7.15 Low sensitivity road users at PVPs 8 and 9 experience medium magnitude changes, which result in moderate/minor adverse effects. The effects reflect partial visibility of construction,



often seen from oblique angles or medium-range views. PRoW and road users combined at PVP 11, low sensitivity, also experience medium magnitude change leading to a **moderate/minor adverse** effect.

11.7.16 At PVP 12, medium sensitivity road users experience a high magnitude of change due to close proximity and clear views, resulting in a major/moderate adverse level of effect. Similarly, PRoW users at PVP 13, with high sensitivity and high magnitude of change leading to a major adverse level of effect, reflecting direct and prominent views of construction works.

11.7.17 Road users at PVP 20 experience a low magnitude of change, which corresponds to a moderate/minor adverse effect. PRoW users at PVP 21, experience a medium magnitude of change that leads to a major/moderate adverse effect. Road users at PVP 22 experience a medium magnitude of change, resulting in a **moderate adverse** level of effect.

Visual Effects on Receptors Within 600m-1.5km of the Site

11.7.18 Between 600m-1.5km from the Site, receptors generally experience lower magnitudes of change, though their sensitivity often remains high due to their recreational or road user status.

11.7.19 Road users at PVP 10, with medium sensitivity, experience a medium magnitude of change during construction. This leads to a moderate adverse level of effect, as construction activities remain visible but less prominent due to distance and partial screening.

11.7.20 PRoW users at PVP 14, also experience a medium magnitude of change. The level of effect is assessed as major/moderate adverse, reflecting their sustained visual engagement with the landscape and clearer views of construction-related changes despite the increased distance.

11.7.21 At PVP 15, medium sensitivity road users experience a low magnitude of change. This results in a moderate/minor adverse effect, with views of construction partially screened or glimpsed and generally less impactful due to travel speed and oblique direction of view.

11.7.22 PRoW and road users at PVP 18, with high sensitivity, experience a very low magnitude of change. This leads to a moderate/minor adverse effect, reflecting occasional glimpses of construction activity largely softened by intervening vegetation.

11.7.23 Finally, at PVP 23, receptors with very high sensitivity along the North Wales Pilgrim's Way experience a negligible magnitude of change. Distance and vegetative screening prevent perceptible views of construction activities, resulting in a negligible magnitude of change and no effect.

Visual Effects on Receptors Within 1.5-5km of the Site

11.7.24 Receptors located between 1.5-5km from the Site generally experience very low magnitudes of visual change during construction, largely due to distance and intervening landscape features.

11.7.25 PRoW users at PVPs 16 and 17, both classified as high sensitivity receptors, experience a very low magnitude of change. This leads to a moderate/minor adverse level of effect. The combination of distance, hedgerow screening, landform, and intervening development means that construction activities such as vehicle movement, solar panel erection, and fencing installation are barely perceptible from these elevated viewpoints, reducing their visual impact.

11.7.26 At PVP 30, also a PRoW receptor with very high sensitivity, the magnitude of change is negligible due to effective vegetative screening that prevents intervisibility with the Site. Consequently, the level of effect is negligible with no adverse impact anticipated.



Visual Effects on Receptors Beyond 5km of the Site

- 11.7.27 Beyond 5km, receptors experience very low magnitudes of change during construction due to the extensive distance and the screening effects of intervening vegetation and built form. However, sensitivities are high to very high for recreational and PRow users, within the CRDVNL leading to varying levels of effect from moderate to negligible adverse.
- 11.7.28 Recreational users and scenic viewpoints such as at PVP 19, with very high sensitivity, experience a very low magnitude of change. This leads to a moderate adverse level of effect, representing a minor perceptible change within wide, panoramic views.
- 11.7.29 Road users at PVPs 24 and 27, classified as medium sensitivity receptors, experience very low magnitude changes resulting in minor adverse levels of effect. PVP 27a benefits from additional screening, with negligible magnitude of change and no anticipated effect.
- 11.7.30 Recreational users at PVPs 25 and 25a, both of high sensitivity, experience very low magnitude changes, which lead to moderate/minor adverse effects. Similarly, PVPs 26 and 26a, recreational receptors with very high sensitivity, experience very low magnitude changes resulting in moderate adverse effects.
- 11.7.31 At PVP 28, recreational users with high sensitivity experience very low magnitude change and a very low, moderate to minor adverse level of effect. In contrast, PVP 28a is effectively screened, resulting in negligible magnitude of change and no effect.
- 11.7.32 Finally, PRow users at PVP 29, with very high sensitivity, experience a very low magnitude of change during construction. This leads to a very low, moderate adverse level of effect, representing a subtle but noticeable component within extensive landscape views.

Summary of Construction Effects

- 11.7.33 The highest level of effect to the landscape resource would be experienced by the change to the existing agricultural landscape to Solar and BESS development with the associated infrastructure. This direct effect would be moderate/minor adverse and not significant and would be limited to the Site through the retention of mature landscape features, intervening landscape and local topography.
- 11.7.34 During construction, activity such as temporary compounds and the movement of machinery may be perceptible in distant views from the CRDVNL. However, the construction activities would occupy a very small proportion of the broad, panoramic view at any given time (with development phased) and would be seen within a settled and visually layered lowland context. There would be no direct impact on the physical key characteristics such as rolling hills, rushing rivers, heather topped moorlands of the CRDVNL. Given the distance from the Site, any change to visual and perceptual qualities such as tranquillity, remoteness, and perceived natural character would be very limited. The magnitude of change is assessed as very low to negligible, resulting in a moderate adverse effect to no effect, which is considered to be not significant. In accordance with Paragraph A1.29 of the LVIA methodology at Appendix G.2, professional judgement has been applied to conclude that these very low magnitude changes, which are barely perceptible or almost imperceptible, do not materially alter the character or quality of the view or landscape and therefore do not result in significant effects.
- 11.7.35 The level of effect at construction is summarised as follows:
- High sensitivity PRow users within 600m of the Site (e.g. PVPs 4, 13 and 21): major, adverse to major/moderate adverse and **significant**;
 - Medium sensitivity road users within 600m (e.g. PVPs 6-7, 12, 20 and 22): major/moderate, adverse to moderate adverse and **significant**;
 - Low sensitivity road users within 600m (e.g. PVPs 1-3, 5 and 8-9): moderate, adverse to moderate/minor, adverse and **significant** to not significant;



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- PRoW and road users between 600m and 1.5km (e.g. PVPs 10 and 14): major/moderate, adverse to moderate, adverse and **significant**;
- PRoW and road users between 600m and 1.5km (e.g. PVPs 15 and 18): moderate/minor, adverse and not significant;
- PRoW users between 1.5km and 5km (e.g. PVPs 16, 17 and 30): moderate/minor, adverse to no effect and not significant; and
- Recreational users and road users beyond 5km (e.g. PVPs 19 and 24-29): moderate, adverse to minor, adverse, with some receptors experiencing no effect and not significant. While the application of the methodology matrix results in a 'moderate' level of effect for receptors with very high sensitivity and a very low magnitude of change, this does not equate to a significant effect in EIA terms. In accordance with LVIA methodology at Appendix G.2, professional judgement has been applied to conclude that these very low magnitude changes, which are barely perceptible or almost imperceptible, do not materially alter the character or quality of the view or landscape and therefore do not result in significant effects.

Operational Phase (Year 1)

- 11.7.36 The assessment of effects undertaken within Appendix G.3: Schedule of Effects Tables and Appendix G.4: RVAA provides a RVAA of the potential effects at Years 1 and 15 during operation. Effects at Year 1 consider the Proposed Development where mitigation (such as proposed trees and hedgerows) has not yet established and matured. Year 15 considers the effect after the proposed mitigation has established and matured and therefore identifies the residual (long-term) effects in terms of the EIA.
- 11.7.37 The level of effect on visual receptors at Year 1 is generally reduced compared to construction due to the cessation of movement, noise, and temporary works. The completed Proposed Development forms a low-level feature within the landscape.
- 11.7.38 Furthermore, it is often the case that initial short-term (Year 1) effects would be greater than those at medium to long-term Year 15 due to the limited initial effect of the strategic landscape proposals incorporated into the Proposed Development. Additionally, as the Proposed Development is likely to be implemented in phases, construction and operational activities on the Site may overlap.
- 11.7.39 It is anticipated that by Year 15, substantial vegetation growth would have occurred, and these proposed landscape features should be fulfilling their roles more effectively. Furthermore, enhanced mitigation should be achieved beyond Year 15 as trees, in particular, reach mature size and provide greater visual screening.

Operational Year 1: Landscape Character

- 11.7.40 At Year 1, the most notable landscape character effects would remain concentrated within the boundaries of the Solar Site and BESS Site, where the change from solely agricultural land to solar development and BESS infrastructure is visible, noting that the land within the solar farm would continue in a form of agricultural use as the areas under and around the panels would be managed as grassland suitable for grazing. At this stage, new mitigation planting would not have matured, but construction works would have ceased, resulting in a reduced medium. The magnitude of change is considered to remain high. As a result, the level of effect on the Site character of the Solar Site is assessed as moderate/minor adverse, which is **not significant** in EIA terms. The level of effect on the Site character of the BESS Site is assessed as major/moderate adverse and **significant** in EIA terms.
- 11.7.41 Within NLCA 8: North Wales Coast, effects would remain limited to a very small portion of the overall character area. The Solar and BESS infrastructure would form low-level features, not altering the broader perception of the character area. The magnitude of change is assessed as very low, resulting in a minor adverse level of effect, which is **not significant**.



- 11.7.42 For host LANDMAP aspect areas, the solar arrays and BESS development would form a minor and barely noticeable component in middle to long-range views. Visual and Sensory and Historic Landscape aspects are subject to very low magnitude changes, resulting in moderate/minor adverse effects. Landscape Habitats and Geological Landscape aspects are subject to low magnitude changes, resulting in minor adverse effects. Cultural Landscape changes remain negligible, with no effect. Overall, the effects are **not significant**.
- 11.7.43 In non-host LANDMAP Visual and Sensory aspect areas within 3km, effects are generally low in magnitude and assessed as moderate/minor adverse, and not significant. The solar panels would be dynamic, moving in accordance with the position of the sun, which may lead to subtle perceptual shifts in views over time. These would not notably conflict with the rural and infrastructure-influenced context of these landscapes. Between 3–10km, the magnitude of change is very low, and although sensitivity may be medium to very high, the effects are **not significant** due to limited perceptibility and the low prominence of the Proposed Development.
- 11.7.44 For designated landscape receptors, including the Betws yn Rhos SLA, the magnitude of change is very low, and effects are moderate/minor adverse and **not significant**. The Proposed Development would not be visible from the majority of the SLA. When visible in a framed or elevated view, it will form a noticeable component in the middle distance. Available views are expansive and visually layered, and the Proposed Development will not interrupt the skyline or diminish key characteristics of the SLA such as views to Eryri NP, the coast, or the CRDVNL. While the CRDVNL lies approximately 5.9km to the east of the Site at its closest point, the Proposed Development would be perceptible only from limited elevated locations in westward views, occupying a background position in such views.
- 11.7.45 From within the CRDVNL, the Proposed Development would be perceptible in the context of the Vale of Clwyd, which forms part of the designation's wider visual setting and contributes to its sense of scale and contrast. The Solar and BESS infrastructure would consist of low-level built form, with the BESS in particular presenting as a visually recessive feature (where seen at all) within a rural foreground already influenced by built form and infrastructure. The key characteristics and special qualities of the CRDVNL, such as its upland landform, cultural features, and panoramic views, would remain entirely intact and unaffected. The magnitude of change is assessed as very low, resulting in a moderate adverse level of effect, which would be **significant**.

Operational Year 1: Visual Receptors

- 11.7.46 At Year 1 construction activities would have ceased, the completed solar arrays, inverters, fencing, substations, and BESS units would remain visible from some nearby receptors, especially where mitigation planting has not yet matured. The absence of construction machinery and active ground disturbance reduces overall visual disruption. Between 600m and 1.5km, effects are typically reduced further due to distance, partial screening, and the absence of construction activity, although the solar panels tracking movements may still be discernible in the landscape. Beyond 1.5km, effects remain low to negligible and **not significant**, especially where views are filtered by vegetation or intervening features. The RVAA (contained at Appendix G.4: RVAA) is summarised first under a separate sub heading below.

Residential Visual Amenity Assessment at Year 1

- 11.7.47 At Year 1, significant visual effects for residential receptors are anticipated for the properties listed in **Table 11.6** below. R4 would experience a substantial level of effect at Year 1. Properties that would experience a major level of effect at Year 1 are R8, R13, R44, and R49. Properties that would experience a major/moderate level of effect at Year 1 include R6, R7, and R39.



Table 11.6: Year 1 Effects on Residential Visual Amenity

EDP ID	Name	Level of Effect at Year 1
R4	Bodoryn Chapel/1-4 Bodoryn Cottages, Rhuddlan Road, Abergele	Substantial
R6	Corsydd Cottage Morfa, Rhuddlan Road, Abergele	Major/Moderate
R7	Willow Cottage, Rhuddlan Road, Abergele	Major/Moderate
R8	Pen y Bont, Rhuddlan Road, Abergele	Major
R13	Morfa Chapel, Abergele	Major
R39	Brook Avenue/Gors Road, Towyn	Major/Moderate
R44	Waen Meredydd, St Asaph	Major
R49	Y Bwthyn/Ysguboriau Flats 1-5/Pentre Mawr Farm, Groesffordd Marli	Major

Visual Effects on Receptors Within 600m of the Site

11.7.48 At Year 1, significant visual effects are anticipated for several receptors within 600m of the Site. These include PRoW users at PVPs 4, 13 and 21, who are high sensitivity receptors and would experience major/moderate to moderate adverse effects, due to open, close-range views of solar infrastructure before mitigation planting has matured. Road users at PVPs 6 and 12, of medium sensitivity, would experience moderate adverse effects, considered **significant** given their proximity and the open nature of views. Road users at PVPs 7 and 22, also of medium sensitivity, would experience moderate/minor adverse effects, which are also considered **not significant**. The low sensitivity road users at PVPs 1–3, 5, 8 and 9 would experience moderate/minor to minor adverse effects, which are **not significant**, reflecting limited visibility or oblique, filtered views.

Visual Effects on Receptors Within 600m-1.5km of the Site

11.7.49 Within 600m to 1.5km of the Site, some receptors would continue to experience significant effects at Year 1. PRoW users at PVP 14, with high sensitivity, would experience moderate adverse effects, due to broad views across the open floodplain toward the Solar Site. Road users at PVP 10, of medium sensitivity, would experience moderate/minor adverse effects, also considered **not significant**. Additionally, PRoW/road users at PVP 15, 18 would experience moderate/minor to minor adverse effects, which are not significant, due to filtered and glimpsed views. Receptors at PVP 23, located on the North Wales Pilgrim's Way (long-distance route) and with very high sensitivity, would experience no effect, due to complete visual screening by woodland and field boundary vegetation.

Visual Effects on Receptors Within 1.5-5km of the Site

11.7.50 At distances between 1.5km and 5km, visual effects are reduced and are not significant. PRoW users at PVPs 16 and 17, although of high sensitivity, would experience moderate/minor adverse effects, owing to the very low visibility of the Proposed Development at this range. At PVP 30, a very high sensitivity PRoW location, the Site would remain screened by intervening vegetation, resulting in no effect and therefore **not significant**.

Visual Effects on Receptors Beyond 5km of the Site

11.7.51 Beyond 5km, visual effects would be experienced by very high sensitivity receptors. Scenic viewpoint users at PVP 19, with very high sensitivity, would experience a very low magnitude of change resulting in a moderate adverse effect. At Year 1, the introduction of new development into an open and panoramic view, combined with the absence of established mitigation planting, means this effect is considered **significant** in EIA terms. Road users at PVPs 24 and 27, and recreational users at PVPs 25, 25a, 26, 26a, and 28 would similarly experience very low levels of change giving rise to moderate/minor to minor adverse effects.



PRoW users at PVP 29, with very high sensitivity, would experience a moderate adverse effect which at Year 1 is judged **significant** for the same reasons.

Summary of Operational Year 1 Effects

11.7.52 At Year 1, the most significant visual effects continue to occur close to the Site, particularly from PRoW and road users within 600m, where the full extent of the operational Proposed Development remains visible and mitigation has not yet matured. Significant effects also occur between 600m and 1.5km for some receptors with clear and direct views towards the Site. Beyond this, visual effects are reduced by distance, screening and the low-level height of the Proposed Development, and are not significant.

- High sensitivity PRoW users within 600m (e.g. PVPs 4, 13, 21): major/moderate to moderate adverse effects – **significant**;
- Medium sensitivity road users within 600m (e.g. PVPs 6-12): moderate adverse – **significant**;
- Medium sensitivity road users within 600m (e.g. PVPs 7-22): moderate/minor adverse – not significant;
- Medium to Low sensitivity road users within 600m (e.g. PVPs 1-3, 5, 8-9): moderate/minor to minor adverse – not significant;
- PRoW and road users between 600m and 1.5km (e.g. PVPs 14): moderate adverse – **significant**;
- PRoW and road users between 600m and 1.5km (e.g. PVPs 10, 15, 18, 23): moderate/minor or no effect – not significant;
- PRoW users between 1.5km and 5km (e.g. PVPs 16, 17, 30): moderate/minor adverse to no effect – not significant; and
- Recreational and road users beyond 5km (e.g. PVPs 19, 24-29): moderate to minor adverse, or no effect – not significant. While the application of the methodology matrix results in a 'moderate' level of effect for receptors with very high sensitivity and a very low magnitude of change, this does not equate to a significant effect in EIA terms. In accordance with the LVIA methodology at Appendix G.2, professional judgement has been applied to conclude that these very low magnitude changes, which are barely perceptible or almost imperceptible, do not materially alter the character or quality of the view or landscape and therefore do not result in significant effects.

11.8 Residual Effects

11.8.1 By Year 15, embedded mitigation such as hedgerow restoration, tree planting, and woodland copse establishment would have matured, helping the development to better integrate into the landscape.

Construction

11.8.2 Visual effects during the construction phase are assessed assuming standard mitigation (e.g., site management and screening). These are temporary and not considered residual effects in EIA terms.



Operational Phase (Year 15)

Operational Phase Year 15: Landscape Character

- 11.8.3 By Year 15, the embedded mitigation and enhancement measures implemented across both the Solar Site and BESS Site would be well established, resulting in notable improvements to local landscape character alongside continued presence of energy infrastructure.
- 11.8.4 The character of the Solar Site would be defined by a more structurally diverse and ecologically rich landscape than at the baseline stage. The establishment of new hedgerows would more than compensate for any hedgerow lost to facilitate the development (which is minimal), reinforcing the historic field pattern and contributing to the legibility of the agricultural landscape. Additional planting would enhance existing boundaries and create continuous wildlife corridors across the Site, while the proposed woodland copse and scattered tree planting would increase visual enclosure and landscape complexity. Grassland enhancements to create species-rich grassland across the Site, along with a dedicated ecological enhancement and mitigation area which includes habitat creation, fallow land featuring scrapes and wildlife ponds and wetland habitat, would deliver biodiversity benefit and mitigation for skylarks and other bird species.
- 11.8.5 Although the solar arrays would remain visible in the landscape, they would be better assimilated within a more enclosed and vegetated land cover. The magnitude of change would remain medium due to the scale of built form and continued presence of infrastructure; however, there would be clear beneficial effects on Site character, particularly in relation to landscape structure and habitat value, and leading. This would lead to a moderate/minor, neutral level of effect on the Solar Site, which is **significant** in EIA terms.
- 11.8.6 At the BESS Site, the Year 15 landscape would similarly reflect the maturing of enhancement measures. A newly planted hedgerow along the northern boundary would re-establish a historically lost feature, while existing hedgerows are allowed to outgrow and be reinforced through infill planting which would contribute to enclosure and a more vegetated setting. Tree planting along Site boundaries would further aid visual containment and enhance landscape structure. While the BESS infrastructure would still exert an influence on Site character, the surrounding vegetation would soften its presence. The magnitude of change is assessed as medium, but with clear associated benefits in terms of landscape restoration and enhancement and therefore there is an overall moderate, neutral level of effect, which is **significant** in EIA terms.
- 11.8.7 By Year 15, the Proposed Development would be increasingly assimilated into the receiving landscape due to the successful establishment of embedded mitigation measures and enhancement planting. Within the host NCLA, the magnitude of change would be very low, as the Proposed Development becomes less prominent within a more enclosed and structurally diverse setting. Reinforcement of field boundaries, new hedgerow and tree planting, and the development of species-rich grassland would contribute positively to rural character, resulting in a minor, neutral effect, which is **not significant**.
- 11.8.8 Similar outcomes would apply across the host LANDMAP aspect areas for both the Solar and BESS Sites, where the Proposed Development would remain present but be better integrated and screened. Key landscape characteristics and perceptual qualities would be largely maintained, and proposed landscape mitigation would have matured. Residual effects would be minor neutral and not significant. For non-host LANDMAP aspect areas, where the Proposed Development is visible at greater distance or not at all, visibility and influence on landscape character would continue to reduce over time, resulting in minor, neutral effect, which is **not significant**.
- 11.8.9 By Year 15, the embedded mitigation and enhancement measures associated with both the Solar Site and BESS Site will have matured, contributing to the softening of built form and its integration into the wider lowland landscape. From the Betws yn Rhos SLA, views towards the Solar Site will continue to be framed and filtered by intervening vegetation, with the Proposed Development appearing within a visually layered and settled rural context. There would be no



direct effects to the SLA, and the key characteristics and special qualities of the designation such as views towards Yr Wyddfa and the coast would remain unaffected. Indirect effects are assessed as negligible and **not significant** at Year 15.

- 11.8.10 From the CRDVNL at Year 15, the Proposed Development would be barely perceptible, in the distant background of west-facing views, predominantly screened or visually softened by established hedgerows and woodland. The key features and scenic qualities of the CRDVNL would be unchanged, and the magnitude of change is assessed as very low, resulting in a moderate, adverse effect at Year 15 which is **not significant**.

Operational Phase Year 15: Visual Receptors

- 11.8.11 By Year 15, the level of visual effect would reduce for most receptor locations; however, for two publicly accessible viewpoints: PVP 4 (from the PRoW near Pen-y-Bont cottage) and PVP 13 (from the PRoW on the southern edge of Towyn) residual effects would be moderate adverse and significant. The embedded mitigation and enhancement planting, including new hedgerows, trees, and a woodland copse, would have matured and contributed to filtering and softening views, however the magnitude of change at these locations is assessed as low due to the continued visibility in close proximity views. These receptors are both located on PRoW and are sensitive to changes in landscape character and visual amenity. As such, despite the reduction in visibility and increased landscape integration, the residual effects at Year 15 for these receptors remain adverse and **significant** in EIA terms.
- 11.8.12 Beyond 5km, visual effects experienced by very high sensitivity receptors would remain very low as the proposals would remain barely perceptible in the landscape context. However, as the mitigation planting matures, and the Proposed Development weathers and assimilates into the wider landscape, and with the passing of time, familiarity and adaptation lessen perception of change. At this stage, the moderate adverse effects would no longer be considered significant in EIA terms.

Operational Phase Year 15: Residential Visual Amenity Receptors

- 11.8.13 The residual effects for the residential receptors considered in the Residential Visual Amenity Assessment (RVAA) at Year 15 show that none of the properties within the Study Area were considered to meet the RVAA threshold. No properties were ascribed a 'very high' magnitude of change, or 'very substantial' level of effect in this assessment which is the highest range of effects in accordance with the methodology employed.
- 11.8.14 R4 would experience a substantial level of effect at Year 1, and with mitigation this would be reduced by Year 15. Properties that would experience a major level of effect at Year 1 are R8, R13, R44, and R49. All anticipated effects would be reduced by mitigation proposals by Year 15 and effects would be **not significant**.
- 11.8.15 Properties that would experience a major/moderate level of effect at Year 1 include R6, R7, and R39. R6 is the only property of this group whereby mitigation measures would not reduce effects over time - views are limited to first floor windows however and no open or close-range views were identified from main living areas. The level of effect on R6 at Year 15 is major/moderate, adverse which is **significant**.

Summary of Operational Year 15 Effects

- 11.8.16 At Year 15, whilst there would be beneficial landscape enhancements associated with the Solar Site and the BESS Site, the presence of the Proposed Developments will continue to influence Site character, and the magnitude of change remains medium. The level of effect on the Solar Site is moderate/minor, neutral and **significant**. The level of effect on the BESS Site is moderate, neutral and **significant**.



11.8.17 From the CRDVNL, the Proposed Development would be barely perceptible, if at all, in the distant background of west-facing views, predominantly screened or visually softened by established hedgerows and woodland. The key features and scenic qualities of the CRDVNL would be unchanged, and the magnitude of change is assessed as very low resulting in a moderate, adverse, which at Year 15 is **not significant**.

11.8.18 For all other landscape receptors, the magnitude of change at Year 15 would be very low or negligible, resulting in minor adverse or negligible effects which are **not significant**.

11.8.19 Visual receptors would also experience a reduced level of effect:

- For PRoW users at PVP 4 (from the PRoW near Pen-y-Bont cottage) and PVP 13 (from the PRoW on the southern edge of Towyn) residual effects would reduce to moderate adverse, however would remain **significant** in EIA terms;
- PRoW users and elevated viewpoints: The Proposed Development would be increasingly screened or assimilated, becoming less perceptible or unrecognisable in most views; and
- All other visual receptors: Effects reduce to minor adverse or no effect which are **not significant**.

Decommissioning

11.8.20 During decommissioning, the Proposed Development infrastructure would be removed, and activity on-site would be similar to that during construction. However, the proposed landscape mitigation and enhancements would be retained, and effects would be much less than those during construction. Effects would be similar to those experienced at Year 15 during operation, albeit with localised noise levels that may disturb tranquillity at a local level. Overall, the Site would have retained its enhanced fabric and be returned to agricultural use.

11.9 Cumulative Effects

11.9.1 This section includes a list of sites which are scoped into the cumulative landscape and visual impact assessment (CLVIA). An assessment of cumulative effects that would be wrought might arise as a result of the Proposed Development coming forward simultaneously with other sites that are in scoping, in planning or consented. Cumulative effects are considered at construction and operation.

11.9.2 The cumulative projects (with status and proximity) are:

- Land north of A547 Rhuddlan Road, Towyn (0/40999): 24 MW ground-mounted PV farm (consented; largely overlaps the Solar Site);
- Awel y Môr Offshore Wind Farm (EN010112): wind farm and associated works (consented; partially overlaps the BESS Site);
- Mona Offshore Wind Farm (EN010137): wind farm and associated works (consented; partially overlaps the BESS Site);
- St Asaph Solar Farm (DNS CAS-01392-D2TSF3): ~18.4 MW solar PV with infrastructure (in scoping; ~800 m south-east of BESS Site);
- Land Adjacent to Maes Owen, Abergele Road (40/2024/1079/PF): 49 dwellings, roads, open space (consented; ~500 m south-east of Solar Site); and
- Land at Bryn Morfa (40/2023/0627): 31 dwellings, access roads (consented; ~600 m south-east of Solar Site).



- 11.9.3 Three cumulative sites physically overlap with the boundary of the Proposed Development. Land north of A547 Rhuddlan Road, Towyn: (0/40999) is a consent which has been built out in part, namely Kinmel Solar Park, and the rest of the consent covers land which is the area concerning the Proposed Development (i.e. the principal Site that is the subject of this ES) therefore the precedent for solar development has already been established, and the remaining consented areas within the Site that were not built out, could in theory be built out without the need for further planning approval. Land north of A547 Rhuddlan Road, Towyn has been scoped out from further consideration in the CLVIA as Kinmel Solar Park forms part of the baseline, and the rest of the extant consent would be superseded by the Proposed Development, should it come forward.
- 11.9.4 Awel y Môr Offshore Wind Farm: (EN010112) (~500 MW500 MW+), and Mona Offshore Wind Farm: (EN010137) (~1500 MW1500 MW); are two consented Development of National Significance (DNS) for major renewable energy projects. The developments comprise offshore turbines, offshore cabling, and onshore substations which are consented and being delivered. Ancillary development for both DNS sites overlap with the boundary of the BESS Site. The turbines themselves would not result combined visual effects with the Proposed Development due to the distance between them and the Site, and the existing seascape, which is already characterised by offshore windfarms.
- 11.9.5 The associated ancillary infrastructure related to the consented developments include temporary construction access and laydown areas, as well as 2 × 400 kV underground cables running through parts of the BESS Site and adjacent land, including the substation for the Mona Offshore Windfarm located directly south of the BESS Site. It should be noted that the interface with the Mona Offshore Windfarm project is limited solely to the underground cabling and temporary laydown areas, with no permanent above-ground works or operational impacts within the BESS Site.
- 11.9.6 The layout of the BESS Site and the consented developments, where overlapping, have been coordinated to facilitate construction and access for the operational lifespan of the committed developments.
- 11.9.7 The most notable change would be the direct landscape effects on the BESS Site. Cumulative effects at construction are ascribed a moderate and significant adverse effect. These effects are the same when the BESS Site is considered in isolation. At Year 15, the effects for the Proposed Development in isolation were found to be not significant, and the same result is concluded when the cumulative scenario is considered. The residual cumulative landscape effects for the BESS Site area physically affected would be no more than moderate/minor adverse and not significant.
- 11.9.8 The most notable cumulative visual effects would be experienced by Wean Meredydd, a residential dwelling to the north-west, and users of the nearby minor road and PRoW to the west of the BESS Site. The resulting effects are not considered much greater than the effects arising as a result of the Proposed Development in isolation although the detail of Mona Wind Farm substation is not fully known. The existing substation seen in the immediate site context influences the visual context in which the cumulative effects at construction, and operation, would be experienced.
- 11.9.9 In summary, the BESS Site has a visually contained envelope, and any cumulative effects arising from the Awel y Môr and Mona Offshore Wind Farm are highly localised. These cumulative effects are not expected to substantially increase the residual effects compared with the Proposed Development considered in isolation. For the BESS Site, the residual cumulative visual effects are anticipated to be no greater than moderate adverse and not significant for Wean Meredydd, and moderate/minor adverse and not significant for road users and PRoW users.
- 11.9.10 There are no nighttime effects anticipated with the Proposed Development therefore no cumulative nighttime effects (landscape or visual) are reported.



11.9.11 St Asaph Solar Farm: is currently in scoping. The Planning, Design and Access Statement (DAS) summarises the landscape and visual effects as follows:

'At Year 15, following the establishment of the proposed landscape strategy, none of the landscape receptors will be subject to significant residual effects as a result of the Proposed Development. Four landscape receptors will be subject to minor beneficial residual effects: Landscape Habitats AA Cefn Improved Grassland; native hedgerow; canopy trees; and waterbodies. None of the visual receptors will experience significant residual effects. Residual effects on the National Landscape and visual receptors within it will not be significant.'

11.9.12 Beneficial residual effects to landscape character are anticipated for St Asaph Solar Farm. The cumulative scenario with the Proposed Development is less certain due to the status of St Asaph Solar Farm though cumulative effects would likely be neutral should both solar farms come forward.

11.9.13 In terms of combined visual effects, it is anticipated that the cumulative sites would be seen in combination with the Proposed Development from parts of the National Landscape. A comparison of the findings available in the public domain suggests that the zone of influence for the cumulative site is shaped by the ridgeline to the south and south-west, namely Cefn Meiriadog and the CRDVNL to the east, although the ZTV for the cumulative site in scoping does not account for the screening effects of built form and vegetation, so in reality, the visual envelope is likely to be reduced, however a review of the viewpoint selection has been carried out to compare the selection included in the LVIA.

11.9.14 The majority of the viewpoints included as part of this ES would not be affected by the cumulative site. Sequential views are more likely to be experienced, whereby views of the BESS site and the cumulative site are experienced in sequence for those moving through the landscape, on minor roads to the south of the BESS site. The effects of the Proposed Development by itself would not result in significant residual effects, and the sequential views are not considered to result in significant effects either due to the sunken nature of the lanes, and the layers of vegetation experienced in this part of the landscape. Where views might be glimpsed, they would also be oblique from these minor roads.

11.9.15 Elevated views from the east, such as those from elevated parts of the CRDVNL may give rise to combined views with the Solar Site and the cumulative sites. The Proposed Development is circa 5.9km from the CRDVNL at its closest point. Given the geographical distance and direction between the Solar Site and the cumulative site is circa 5.5km south-east, and the cumulative effects are unlikely to give rise to significant visual effects given the panoramic context which is experienced from such elevated points from the CRDVNL. The baseline view over the Vale of Clwyd is also expansive and varied with settlement, industrial development, road and renewable infrastructure on shore and offshore making up the patchwork of the landscape. It is unlikely that the Solar Site and the cumulative sites would be perceived to create an obvious pattern in the landscape.

11.9.16 Lastly, two residential developments bordering the east and west of Bodelwyddan have been consented; Land Adjacent to Maes Owen, Abergele Road and Land at Bryn Morfa. These sites are south of the Solar Site, measuring circa 500m and 600m from the Site boundary at their closest respective points. Both developments would be edge of settlement. The detail of these cumulative sites is not known in detail at this point, but the Site locations and the quantum of development is known, and it can be assumed that both schemes would retain the boundary vegetation and existing field patterns, similar to the strategy of the Solar Site.

11.9.17 Of the viewpoints assessed in this ES, there were no views identified in which the Proposed Development would be seen in combination with either of the cumulative residential sites. Sequential views may be perceptible from local roads, namely Abergele Road, Ronalds Way and St Asaph Road, although views of the cumulative sites would be oblique from these routes, and unlikely to be an obvious addition to the already settled context. Close range views of Maes Owen would be available from Abergele Road, and these views would be completely curtailing additional views towards the Proposed Development. The consented cumulative residential sites do not overlap with any of the host LANDMAP aspect areas with



the Proposed Development. There are no notable cumulative landscape and visual effects anticipated as a result of the Proposed Development in combination with Land Adjacent to Maes Owen, or Abergele Road and Land at Bryn Morfa.

11.9.18 In summary, two consented DNS sites overlap with the BESS Site and significant cumulative effects have been identified during the construction phase for one receptor in proximity to the site, namely Wean Meredydd (residential receptor). The cumulative effects are reduced to not significant during operation, at Year 1 and Year 15.

11.9.19 St Asaph Solar Farm is in scoping and two residential developments bordering existing settlement edges in Bodelwyddan have been consented. Visual effects are likely to be limited to sequential views for road users in the local area for each of these cumulative sites. No significant landscape or visual effects have been identified. Cumulative effects with St Asaph Solar Farm form a less certain future scenario due to the status of the scheme.

11.10 Monitoring

11.10.1 Two residual significant visual effects are anticipated at Year 15 from PVP 4 and PVP 13, due to continued visibility of elements of the Proposed Development within the wider landscape context. These effects are expected to lessen further over time as the embedded mitigation planting fully matures. Monitoring is therefore recommended to confirm that the proposed mitigation measures, particularly the establishment and management of hedgerow, woodland copse, and tree planting, are successfully implemented and maintained in accordance with the LEMP. Monitoring should focus on the condition and growth of planting within the first five years post-construction, with corrective actions taken as needed to support the successful delivery of long-term screening and integration.

11.11 Consideration of Climate Change

11.11.1 IEMA's EIA Guide to Climate Change Resilience & Adaptation (2020) states that "*where adaptation is considered in EIA it must be clearly presented within the EIA Report*". It notes that the reporting of In-Combination Climate Change Impacts (ICCI) can be presented within each individual technical chapter. This section should align and be read in conjunction with the climate change ES Chapter. Collaboration with the project's climate consultant is strongly encouraged. Signposting to the climate change ES Chapter can be helpful as it will set out the projected climatic changes in greater detail.

11.11.2 The impact of climate change on the development and each discipline should be considered within this section of each technical chapter. Each assessor should include a high-level qualitative assessment of whether climate change may alter:

- **The sensitivity/ vulnerability of identified receptors** e.g. a main river prone to flooding may become more sensitive to change in an area where heavy rainfall is projected to increase;
- **The anticipated magnitude of effects** e.g. hotter, drier summers will exacerbate dust conditions and could change a 'minor adverse' effect on air quality to 'moderate adverse'; and
- **A potential change in significance** by following the standard significance matrix of sensitivity x magnitude (or whatever methodology the chapter adopts).

11.11.3 Note that climate change may alter sensitivity and magnitude 'positively'. Consider if climate change may also generate new impacts not currently in the assessment. Consideration should be given to the medium (e.g. 2050s) and long term (2080s) as climatic changes will build over time. It is the technical lead's professional judgement to decide if proposed mitigation is sufficient to address this, or if further mitigation may need to be implemented now or at a later stage.



11.11.4 The anticipated climatic changes are as follows:

- Long term changes to climatic norms, including an overall increase in annual temperatures;
- Hotter, drier summers;
- Warmer, wetter winters; and
- Increase in frequency and intensity of extreme weather events such as heatwaves, droughts, and heavy rainfall.

11.12 Conclusions

Introduction

11.12.1 This ES chapter considers the likely effects of the Proposed Development on landscape character and visual amenity. The assessment draws upon Appendix G.1: LVIA Baseline, the Appendix G.2: LVIA methodology and Appendix G.4: RVAA. The assessment of effects tables are contained at Appendix G.3. The assessment was informed by Site visits, representative photoviewpoints, and a detailed understanding of the existing baseline.

Construction Effects

11.12.2 During construction, temporary but noticeable changes would occur, including the presence of solar panels, battery units, and associated infrastructure, as well as construction activity and vehicle movements. A 10m-wide working corridor is required for laying underground cabling, but this would typically be worked on within a 2m width and reinstated afterwards. Careful siting of the route avoids hedgerow removal and protects nearby trees, and in sensitive areas, trenchless techniques will be used.

11.12.3 Mitigation during construction includes the use of existing vegetation to screen works, temporary fencing to protect retained trees, and the LEMP sets out how planting and habitat enhancement will be delivered.

11.12.4 Significant visual effects during construction are predicted for a small number of close-range views from PRow and roads. However, these effects would be temporary and confined to the construction phase.

Operation Effects

11.12.5 Once operational, the Proposed Development will become visually integrated into the surrounding landscape through new planting and management of trees, hedgerows, grassland, and field margins. Over time (likely after year 5), mitigation planting will screen and filter the appearance of the Proposed Development and enhance the baseline landscape fabric.

11.12.6 At Year 15, most views would experience a reduced level of effect. Significant effects remain at only two locations (PVP 4 and PVP 13), where close-range views of the Proposed Development remain. However, by Year 15, once planting has matured, no significant effects are expected from any location.

11.12.7 There would be no significant effects on national or local landscape designations, including the CRDVNL or SLA. No significant residual effects are predicted for the LANDMAP aspect areas.

Overall, the effects of the Proposed Development on landscape and visual receptors are reversible, localised, and reduce over time.



12 Built Heritage

12.1 Introduction

- 12.1.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development in terms of Built Heritage. The built heritage resource to be discussed within this Chapter encompasses historic buildings, structures and monuments; and historic landscapes, which can be either designated historic assets (Listed Buildings, Scheduled Monuments, Registered Parks and Gardens and Registered Historic Landscapes) or non-designated historic assets (historic buildings of some limited architectural interest). The assessment is based on the characteristics of the Site and surrounding area, as well as the key parameters of the Proposed Development detailed in **Chapter 3 – Site and Development Description**.
- 12.1.2 This Chapter considers effects arising through changes to setting and character to these assets. Effects upon the buried archaeological resources are considered separately with **Chapter 7- Archaeology** of the ES.
- 12.1.3 This Chapter is supported by a Historic Environment Desk-Based Assessment, which comprises **Appendix H1**.
- 12.1.4 This Chapter has been prepared by Cotswold Archaeology, a Registered Organisation with the Chartered Institute of Archaeologists. In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix A.4**.

12.2 Policy Context, Legislation, Guidance and Standards

- 12.2.1 Legislation, planning policy, and guidance relating to the assessment of the likely significant effects on built heritage and pertinent to the Proposed Development comprises the documents listed below. More detail regarding these policies can be found in **Chapter 6** of this ES.

Legislation

- 12.2.2 Legislation relating to built heritage comprises:

- The Historic Environment (Wales) Act 2023.¹⁵⁶ This consolidates previous legislation relating to heritage, with the relevant parts comprising Part 2 (Monuments of Special Historic Interest); Part 3 (Buildings of Special architectural and historic interest); Part 4 (Conservation Areas); Part 6 (Other historic assets and records);
- The Hedgerow Regulations 1997¹⁵⁷ is a UK statutory instrument which provides protection for "important" hedgerows. A hedgerow may be deemed important based on ecological, historical, or landscape criteria, including associations with historic features or historical land boundaries. The Act requires prior notification to the Local Planning Authority for any removal of hedgerows identified as important.
- The Well-being of Future Generations (Wales) Act 2015¹⁵⁸ places a duty on decision makers to have regard to pursuing the promotion of the economic, social, environmental and cultural well-being of Wales in a way that accords with the sustainable development

¹⁵⁶ Welsh Government (2023) *Historic Environment (Wales) Act 2023 (Act of Senedd Cymru)* <https://www.legislation.gov.uk/asc/2023/3/part/1>

¹⁵⁷ UK Government (1997) *The Hedgerows Regulations 1997* <https://www.legislation.gov.uk/ukSI/1997/1160/contents>

¹⁵⁸ Welsh Government (2015) *Well-being of Future Generations (Wales) Act 2015* <https://www.legislation.gov.uk/anaw/2015/2/>



principle. It requires consideration of the historic environment as an integral part of promoting cultural well-being and intergenerational equity.

National Planning Policy

12.2.3 National planning policy relating to built heritage comprises:

- Planning Policy Wales (PPW) Edition 12 provides the Welsh Government's planning policies and describes how these are expected to be applied within the planning system. The Historic Environment is subject to Chapter 6 (pages 129-135)¹⁵⁹, which recognises the importance of conserving Scheduled Monuments, Listed Buildings, Registered Historic Parks and Gardens, Registered Historic Landscapes and other historic assets. Any decisions made through the planning system must fully consider the impact on the historic environment and on the significance and heritage values of individual historic assets and their contribution to the character of place.

Local Planning Policy

12.2.4 Local Planning Policy relating to built heritage is as follows:

- Conwy County Borough Council Local Development Plan 2007-2022¹⁶⁰, in particular Strategic Policy CTH/1 – Cultural Heritage; Policy CTH/2 – Development Affecting Heritage Assets, Policy CTH/3 – Buildings and Structures of Local Importance, and Policy CTH/4 – Enabling Development. These policies uphold the council's commitment to protecting and enhancing its cultural and historic assets and seek to ensure that development proposals preserve designated historic assets and their settings. Development proposals affecting building or structures of local importance should not significantly adversely the distinctive appearance, architectural integrity and setting of the buildings.
- Denbighshire County Council Local Development Plan 2006-2021¹⁶¹, in particular Policy VOE 1 – Key Areas of importance, Policy VOE 4 – Enabling Development and Policy VOE 10 – Renewable Energy Technologies. These state that development proposals should maintain and, wherever possible, enhance built heritage sites and historic landscapes and parks and gardens, and that renewable energy developments should demonstrate the proposals would not negatively impact the assets unless there is an overriding public need for the development.

Relevant Guidance

12.2.5 The following guidance documents are relevant to this assessment:

- Technical Advice Note (TAN) 24: The Historic Environment¹⁶²;

¹⁵⁹ Welsh Government (2024) *Planning Policy Wales Edition 12* <https://www.gov.wales/sites/default/files/publications/2024-07/planning-policy-wales-edition-12.pdf>

¹⁶⁰ Conwy County Borough Council (2013) *Conwy Local Development Plan 2007-2022* <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Adopted-Local-Development-Plan-LDP/Assets-written-proposals-maps/Conwy-Local-Development-Plan-2007-2022.pdf>

¹⁶¹ Denbighshire County Council (2013) *Local Development Plan 2006-2021* <https://www.denbighshire.gov.uk/en/documents/planning-and-building-regulations/ldp/adopted-ldp/adopted-local-development-plan-2006-2021.pdf>

¹⁶² Welsh Government (2017) *Technical Advice Note 24: The Historic Environment (TAN24)* <https://www.gov.wales/sites/default/files/publications/2018-09/tan24-historic-environment.pdf>



- Conservation Principles for the Sustainable Management of the Historic Environment in Wales¹⁶³;
- Chartered Institute for Archaeologists' Standard and guidance for historic environment desk-based assessment (2020)¹⁶⁴;
- Setting of Historic Assets in Wales¹⁶⁵;
- Heritage Impact Assessment in Wales¹⁶⁶;
- The Institute of Sustainability and Environmental Professionals (ISEP), Institute of Historic Building Conservation (IHBC) and Chartered Institute for Archaeologists (CIfA) Principles of Cultural Heritage Impact Assessment in the UK¹⁶⁷.

12.3 Consultation

- 12.3.1 A Written Scheme of Investigation (WSI) for the Historic Environment Desk-Based Assessment (**Appendix H.1**) was submitted to the Heneb (The Trust for Welsh Archaeology) advisors for Clwyd-Powys and Gwynedd and approved on 19th December 2024.
- 12.3.2 The Scoping Direction included a response from Cadw (Welsh Government's historic environment service), along with further comments from Heneb, both of which have informed this assessment including the process for selection of designated historic assets to be considered within the settings assessment.
- 12.3.3 Cadw's response included specific reference to a number of heritage assets, including the Vale of Clwyd and Lower Elwy Valley designated historic landscapes. The comments stated the historic landscapes would not require ASIDHOL assessment but should be considered in line with the appropriate settings guidance. Both historic landscapes are assessed within the settings assessment in Appendix H.1, during which they were scoped out at stage 1 due to a lack of any potential harm to their importance

12.4 Methodology

Study Area

- 12.4.1 As recommended by Cadw in their comments provided within the Scoping Direction, a 5 km Study Area was applied for the assessment of the settings of designated historic assets. This was deemed sufficiently comprehensive to capture designated historic assets for which the wider landscape may form a contributing factor to their importance, and which may experience long-term change to their settings as a result of the Proposed Development.

Baseline Data Collection

- 12.4.2 This Chapter has been informed by the work presented within the Historic Environment Desk-Based Assessment which forms **Appendix H.1**. This consulted the following sources:

¹⁶³ Cadw (2011) *Conservation Principles for the Sustainable Management of the Historic Environment in Wales* https://cadw.gov.wales/sites/default/files/2019-05/Conservation_Principles_EN_0.pdf

¹⁶⁴ Chartered Institute for Archaeologists (2020) *Standard and Guidance for Historic Environment Desk-Based Assessment* <https://www.archaeologists.net/sites/default/files/2023-11/CIfA-SandG-DBA-2020.pdf>

¹⁶⁵ Cadw (2017) *Setting of Historic Assets in Wales* <https://cadw.gov.wales/sites/default/files/2019-05/Setting%20of%20Historic%20Assets%20in%20Wales%20EN.pdf>

¹⁶⁶ Cadw (2017) *Heritage Impact Assessment in Wales* <https://cadw.gov.wales/sites/default/files/2019-05/20170531Heritage%20Impact%20Assessment%20in%20Wales%2026917%20EN.pdf>

¹⁶⁷ The Institute of Environmental Management and Assessment, Institute of Historic Building Conservation and Chartered Institute for Archaeologists (2021) *Principles of Cultural Heritage Impact Assessment in the UK* https://www.archaeologists.net/sites/default/files/2024-11/CIfA-IEMA-Principles-Cultural-Heritage-Impact-UK_2021.pdf



Environmental Statement

- Designated historic assets, as listed by Cadw;
- Historic Environment Record data by Heneb: Clwyd-Powys Archaeology;
- National Monuments Record of Wales (held by Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW));
- Natural Resources Wales (NRW) lidar data;
- Aerial photographs curated by the Central Register of Aerial Photographs for Wales;
- Natural Resources Wales (NRW) Landmap data;
- Portable Antiquities Scheme (PAS) data regarding findspots ;
- Historic maps; and
- British Geological Survey.

12.4.3 A walkover of the Site and visits (as possible from public rights of way or the Site boundary) to the designated historic assets which may be affected as a result of change within their settings was carried out in October 2024 and March 2025.

Assessment

Receptor Sensitivity/Importance/Value

12.4.4 The assessment of historic importance (value) has been guided primarily by the policies and guidance contained in Cadw's 'Conservation Principles'. This defines the importance of a historic asset with reference to the following four key forms of value set out in **Table 12.1**.

Table 12.1: Historic values

Values	Description
Evidential	Derives from those elements of a historic asset that can provide evidence about past human activity, including its physical remains or historic fabric
Historical	Derives from aspects of past ways of life, or association with notable families, persons, events, or movements – it embodies the connection between past events and society with the present
Aesthetic	Derives from the sensory and intellectual stimulation drawn from a historic asset. It may include its physical form, and how it lies within its setting. It may also be the result of design, or an unplanned outcome of a process of events
Communal	Derives from the meanings that a historic asset has for the people who relate to it, or for whom it figures in their collective experience or memory. It may be commemorative or symbolic and relate to issues of identity or collective memory

12.4.5 Criteria for assessing historic importance are set out in **Table 7.2**. As well as considering the principles above, this reflects current heritage statute and policy for Wales and professional best-practice guidance, including Cadw publications 'Setting of Historic Assets in Wales' and 'Heritage Impact Assessment in Wales'. The terms expressed in the 'Planning Policy Wales' are used. This defines that the 'most important historic assets' often have statutory protection or are included in formal registers. These include World Heritage Sites, Scheduled Monuments, Protected Wreck Sites, Registered Battlefields, Grade I and II* Listed Buildings, and Grade I



and II* Registered Parks and Gardens. The term significance, as adopted by Planning Policy Wales to describe the interests or values of a historic asset or assets, has been avoided here to save confusion with the EIA terminology of significance criteria and 'significant effects'.

Table 12.2: Importance of Historic Assets

Importance of resource / asset	Description
High	World Heritage Sites and historic assets of acknowledged international importance, or that can contribute significantly to acknowledged international research objectives. Historic landscapes of international sensitivity (designated or not) and extremely well-preserved historic landscapes with exceptional coherence, time depth, or other critical factor(s). Scheduled Monuments and undesignated assets of Schedulable quality and importance, according to the non-statutory criteria for scheduling ancient monuments utilised by the Secretary of State. Historic assets or groups of assets that can contribute substantially to acknowledged national research objectives. Historic landscapes exhibiting considerable coherence, time depth or other critical factors and displaying considerable evidential, historic, aesthetic and communal value as identified by Conservation Principles. Registered Historic Landscapes. Grade I and II* Registered Parks/Gardens. Grade I and II* Listed Buildings or other Listed Buildings that can be shown to have exceptional qualities in their fabric or associations not adequately reflected in their Listing grade, or undesignated structures of clear national importance. Conservation Areas containing very important buildings.
Medium	Historic assets, or groups of assets or landscapes, that contribute to regional research objectives. Historic landscapes exhibiting reasonable coherence, time depth or other critical factors (including degree of preservation) and displaying evidential, historic, aesthetic, and communal value as identified by Conservation Principles. Grade II Registered Parks/Gardens. Grade II Listed Buildings or historic buildings which can be shown to be of comparable importance. Conservation Areas containing important buildings which contribute significantly to their historic character, or historic townscapes with important historic integrity.
Low	Historic assets displaying limited evidential, historic, aesthetic, or communal value as identified by Conservation Principles. Historic assets, or groups of assets, that contribute to a limited degree to regional research objectives. Historic landscapes exhibiting limited coherence, time depth or other critical factors. Historic landscapes whose sensitivity is limited by poor preservation and/or poor survival of contextual associations. Locally Listed buildings and unlisted buildings of modest quality in their fabric or historical association.
Uncertain	Historic assets, the importance of which has not yet been ascertained.
Negligible	Historic assets or groups of assets that cannot appreciably contribute to acknowledged regional research objectives. Historic landscapes exhibiting little or no coherence, time depth or other critical factors and displaying evidential, historic, aesthetic, and communal value as



Importance of resource / asset	Description
	identified by Conservation Principles. Buildings of no architectural or historical note.

Magnitude of Impact

- 12.4.6 The magnitude of impact upon historic assets is defined as the change resulting from development that affects the asset's values. The classification of the magnitude of change on historic assets is rigorous and based on consistent criteria. This takes account of such factors as the physical scale and type of disturbance anticipated and whether features or evidence would be lost that are fundamental to their historic character and integrity. Changes may be adverse or beneficial. Depending on the nature of the change and the duration of development, effects can be temporary and/or reversible or permanent and irreversible. Change in itself, however, may not necessarily be harmful to historic assets. It is noted that Cadw's 'Conservation Principles' defines 'preserve' as 'to keep safe from harm'.
- 12.4.7 This will include the consideration of such issues as: which, and how many, elements of a historic asset are affected; whether the change physically modifies the asset or whether it comprises changes in visual aspects, noise or access that would alter its setting; and whether the change in the importance of an asset will be adverse or beneficial.
- 12.4.8 In terms of the assessment of effects arising from change to an asset's setting, the guidance provided by Cadw in 'Setting of Historic Assets in Wales' makes clear that 'setting is not itself a historic asset' and that its importance 'lies in what it contributes' to the historic values of an asset'.
- 12.4.9 The magnitude of impact on each individual historic asset is assessed using the criteria in **Table 7.3**. Changes may be adverse or beneficial; however, in the most part the descriptions offered below focus on adverse change.

Table 12.3: Magnitude of Impact

Magnitude of Impact	Description
High	Change to most or all historic building values, such that the asset is totally altered. Total changes to valued components of the setting of historic buildings. Change to most or all key valued historic landscape elements, parcels or components; changes to valued sound quality; fundamental changes to valued use or access.
Moderate	Changes to many key historic building elements, such that the asset's values are noticeably modified. Changes to the valued settings of historic buildings, such that it is noticeably modified. Changes to many key historic landscape elements, parcels or components; noticeable differences in valued sound quality; considerable changes to valued use or access.
Low	Changes to key historic building elements, such that the values of the asset are slightly modified. Changes to the valued settings of historic buildings, such that it is slightly altered. Change to a few key historic landscape elements, parcels or components; some limited changes to valued sound quality; slight changes to valued use or access.
No Impact	Inconsequential changes to historic building elements or their settings; to key historic landscape elements, parcels or components; to use or access.



Significance of Effect

12.4.10 The significance of effect upon any historic asset is a product of the importance of the asset, and the magnitude of impact upon its values. This is summarised in

12.4.11 **Table 7.4.** Where two alternatives are given in the table, professional judgement is used to decide which best reflects the significance of effect.

Table 12.4: Criteria for Significance of Effect

Magnitude of Impact	Historic Asset Importance			
	High	Medium	Low	Negligible
High	Substantial	Major	Minor to Moderate	Negligible
Medium	Major to Moderate	Minor to Moderate	Minor	Negligible
Low	Minor to Moderate	Minor to Moderate	Minor	Negligible
No Impact	Negligible	Negligible	Negligible	No Effect

12.4.12 Regarding the significance of the effect upon historic assets, the key principle to be considered is whether the effect is classified as 'significant' (via the EIA regulations (Wales))¹⁶⁸. For the purposes of this report 'significant effects' are considered to be of 'Moderate' significance of effect or higher. The significance of effect can be adverse or beneficial. Such effects may also be temporary or permanent, and reversible or irreversible.

12.4.13 The measured significance of effect may be equated to key concepts in planning policy and heritage guidance regarding the assessment of development effects upon historic assets, as per **Table .5**. When a significant effect is identified, it may be appropriate to propose suitable mitigation measures to avoid, reduce or offset the effect.

¹⁶⁸ Welsh Government (2017) *The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017*. Statutory Instrument 2017 No. 567 (W. 136)



Table 12.5: Description of the significance of effect with reference to heritage policy

Significance of Effect	Criteria
Substantial Adverse	Total loss of the values of a designated historic asset (or asset worthy of designation) such that development should not be consented unless substantial public development is delivered.
Major Adverse	Extensive harm to the values of a designated historic asset (or asset worthy of designation) such that development should not be consented unless substantial public benefit is delivered by the development. Total loss of a historic asset of medium importance without compensatory mitigation measures. Extensive harm to a landscape designated by virtue of its historic landscape value.
Moderate Adverse	Less than extensive harm to or total loss of the values of a designated historic asset (or asset worthy of designation) such that the harm should be weighed against the public benefit delivered by the development to determine consent. Total loss of a non-designated historic asset of medium importance (i.e. which may contribute to regional research objectives) with compensatory mitigation measures agreed with statutory consultees. Harm to a non-designated historic asset, of a greater degree than that perceived of as Minor Adverse, which should be considered in determining an application. Harm to a historic landscape type of more than low importance, and of some rarity.
Minor Adverse (not significant)	Less than extensive harm to the values of a designated historic asset, of a lesser degree than that perceived as Moderate Adverse, but which should still be weighed against the public benefit delivered by the development to determine consent. Harm to a non-designated historic asset that can be adequately compensated through the implementation of a programme of industry standard mitigation measures. Harm to a historic landscape type of limited heritage importance, and not of a rare form.
Negligible	Effect that is imperceptible.
No effect	Effect that is nil.
Minor Beneficial (not significant)	Development will deliver a positive contribution and / or better reveal the values of a non-designated historic asset.
Moderate Beneficial	Development will deliver a positive contribution and / or better reveal the values of a designated historic asset (or asset worthy of designation) such that an application should be treated favourably.
Major Beneficial	Development will deliver a positive contribution and / or better reveal the values of a designated historic asset of recognised greater importance such that an application should be treated very favourably.



Significance of Effect	Criteria
Substantial Beneficial	Development will deliver a positive contribution and / or better reveal the values of many designated historic assets of recognised international importance such that an application should be treated very favourably

Limitations

- 12.4.14 This Chapter has been informed by data collation, research and assessment presented within the Historic Environment Desk-Based Assessment in **Appendix H.1**. This relied upon secondary information derived from a variety of sources. The assumption is made that this data, as well as that derived from secondary sources, is reasonably accurate.
- 12.4.15 While not all assets included within the settings assessment could be closely accessed during the site visits, sufficient observations were made to determine the likely impacts upon the importance of the assets through changes to their settings.

12.5 Baseline Conditions

- 12.5.1 This section of the Chapter identifies key historic assets which have the potential to be impacted by the Proposed Development, and which could be subject to significant effects (sensitive heritage receptors). The importance of these assets is detailed such that the potential impacts can be assessed. As such it should be noted that not all historic assets within the Study Area are reported on and assessed within this ES Chapter; details upon all historic assets not discussed here are presented in **Appendix H.1**.
- 12.5.2 Sensitive receptors are depicted on **Figure 12.1**, with their identifying labels corresponding to those assigned in the Historic Environment Desk-Based Assessment in **Appendix H.1**.

The Site

- 12.5.3 There are no designated historic assets within the Solar or BESS Sites.
- 12.5.4 The Cable Corridor passes through Kinmel, a Grade II* Registered Historic Park and Garden (RHPG) (ES **Figure 12.1**: P2), the boundary of which also lies immediately east and west of the Solar Site. No further designated historic assets or non-designated built heritage assets are located within the Site.

The Surrounding Area

- 12.5.5 Designated historic assets within the 5 km Study Area comprise 21 Scheduled Monuments, 486 Listed Buildings (of which six are Grade I, 64 are Grade II* and 416 are Grade II), three Conservation Areas, six RHPGs (in addition to the aforementioned Kinmel Park) and two Registered Historic Landscapes (Lower Elwy Valley and Vale of Clwyd). Additionally, two buildings in proximity to the Site have been identified as non-designated historic assets: Morfa Methodist Chapel and Bodoryn Chapel.

Identification of Sensitive Receptors

- 12.5.6 Detailed consideration of the potential for the Proposed Development to affect the importance of assets is presented within **Appendix H.1** and it is not repeated here. The Appendix includes the results of Step 1, which scopes out assets that are not sensitive receptors and which are therefore not further discussed within this Chapter. **Appendix H.1** also presents detailed assessment of those of the designated and non-designated historic assets which could be affected by the Proposed Development and may therefore be considered sensitive heritage receptors. These include:



- Kinmel Park Grade II* RHPG (ES **Figure 12.1**: P2) and associated Scheduled Monument and Listed Buildings;
- Bodelwyddan Castle Grade II RHPG and non-designated Bodoryn Chapel (ES **Figure 12.1**: P1) and associated Scheduled Monument and Listed Buildings;
- Grade II Listed Bodoryn Cottages (ES **Figure 12.1**: L9, N1);
- Grade II Listed Toll Bar Cottage (ES **Figure 12.1**: L8);
- Grade II Listed Glan-y-Morfa (ES **Figure 12.1**: L11);
- Non-designated Morfa Methodist Chapel (ES **Figure 12.1**: N2).

12.5.7 A summary of the values (importance) of these assets is provided below, with further detail presented in **Appendix H.1**.

Kinmel Park

- 12.5.8 Kinmel Park (ES **Figure 12.1**: P1) is a Grade II* RHPG located immediately adjacent to parcels 4 and 5 of the Solar Site, and through which part of the Cable Corridor runs. The park contains one Scheduled Monument, St George's Well (ES **Figure 12.1**: S2; located c. 220 m north-west of the Cable Corridor) and 22 Listed Buildings, including the Grade I Kinmel (ES **Figure 12.1**: L2-1), Grade I Llwyni lodge (ES **Figure 12.1**: L2-6), Grade II* Morfa Lodge (ES **Figure 12.1**: L2-3). The remaining Listed Buildings include a stables and coach house, the ruins of Old Kinmel, and various lodges, gatepiers, entrance screens and ornamental features.
- 12.5.9 Kinmel Park originated as the landscaped grounds to an earlier 17th century house, Old Kinmel (L2-2), and was significantly expanded and formalised in the 19th century under the ownership of Hugh Robert Hughes, who commissioned the construction of the present Kinmel Hall (L2-1). The park features a mix of woodland, farmland and formal landscaping, with key features including the late 19th century Venetian Garden, attributed to the prominent landscape designer W.A Nesfield. The park, along with Bodelwyddan Castle Park, was used as a military camp and grounds during the First World War. Buried remains of practice trenches associated with its military use may be present within the Cable Corridor and are considered within ES **Chapter 7- Archaeology**.
- 12.5.10 As a Grade II* RHPG, Kinmel Park is a designated historic asset of **High importance**. Its importance is underpinned by a combination of evidential, historical, and aesthetic values, with considerable 'group value' derived from the various designated and non-designated structures located within it. The park retains substantial physical evidence of historic design, usage, and development, reflecting its association with the Kinmel Estate and the Hughes family, and illustrating changes in landownership, estate management, and country house culture in 19th-century Wales. The park demonstrates a high degree of aesthetic value through its formal composition, structured views, and integration of architectural and natural elements. The park is primarily experienced internally, although there are key aspects of its setting which also contribute to its importance. These include its rural context; its topographical siting on rising ground which gives visual prominence to Kinmel Hall; glimpsed views of estate features from local roads; and the impression of containment and coherence provided by boundary plantings. Modern infrastructure, notably the construction of the A55 to the north, has altered the park's visual and physical connectivity in this direction, severing the main area of the park from its historic northward approach (Coed y Drive) and its associated Morfa Lodge (L2-3).
- 12.5.11 The importance of the individual assets within the park stems largely from their physical forms, exhibiting evidential, historical and aesthetic values associated with the park's design and its evolution over time. The settings of these assets are intrinsic to the park, though a small number do have wider landscape associations such as views from and towards the assets, historic routes, and contextual relationships with the wider agricultural landscape within the historical extent of the Kinmel estate.



Bodelwyddan Castle

- 12.5.12 Bodelwyddan Castle is a Grade II RHPG located immediately north of the Cable Corridor, c. 1.3 km south-east of the Solar Site and 790 m north-west of the BESS Site. The park contains one Scheduled Monument, First World War Practice Trenches at Bodelwyddan Park, located 2.1 km south-east of the Solar Site and 1.5 km north-west of the BESS Site (ES **Figure 12.1: S1**). There are 13 Listed Buildings within the park boundary, including the Grade II* Bodelwyddan Castle (ES **Figure 12.1: L1-1**), a Grade II* Ice House, and a number of Grade II lodges, cottages, walls and garden structures.
- 12.5.13 Bodelwyddan Castle was constructed in the 17th century as a private mansion, later undergoing substantial remodelling into a castellated form in the 19th century. The present park was developed at this time, and included rolling grassland, mature planting, estate buildings and early industrial features reflecting the estate's self-sufficiency. The walled garden was redesigned in c. 1910 in an Arts and Crafts style by Thomas Hayton Mawson. The house and park were requisitioned by army for use as a camp and training grounds during the First World War, with earthworks of practice trenches (S1) located in the south-east of the park.
- 12.5.14 Bodelwyddan Castle RHPG is a designated historic asset of **High importance**, stemming from the evidential, historical (illustrative and associative) and aesthetic values exhibited in its consciously designed layout and the physical architecture of its buildings and structures. Collectively, these elements demonstrate the development of the park over time and provide considerable group value. As a self-contained landscape, the park is primarily experienced from its bounds, where its aesthetic qualities and the interrelationship of its structures and features can be clearly understood. Aspects of the park's wider setting which contribute towards its importance comprise long-ranging views from the castle across the parkland and surrounding landscape to the north, facilitated by its position on locally elevated ground and conveying its high status; and glimpses of the castle and parkland from surrounding roads and public rights of way.
- 12.5.15 The importance of other individual assets within the park relates to the evidential, historical and aesthetic values within their built form, reflecting the design intention of the park and its adaptations over time. These settings of these assets are defined by the park and they have little connection with the wider surrounding landscape.

Bodoryn Cottages and Bodoryn Chapel

- 12.5.16 Bodoryn Cottages (ES **Figure 12.1: L9-1 – L9-4**) are a group of four Grade II Listed Buildings almost immediately adjacent to Parcels 2, 3 and 4 of the Solar Site (**Appendix H.1**). Constructed in the mid to late 19th century, Bodoryn Cottages exhibit features such as rubble stone elevations, slate roofs, and small-pane sash windows. The non-designated Bodoryn Chapel (ES **Figure 12.1: N1**) lies immediately to the east of the cottages and comprises a late gothic style 19th century former chapel, now converted to residential use.
- 12.5.17 Bodoryn Cottages are a designated historic asset of **Medium importance**. Their principal heritage importance derives from their evidential and historical value as traditional Welsh rural dwellings and illustrative components of the area's historical character and is reinforced by their group value. As a non-designated historic asset, Bodoryn Chapel is of **Low importance**, though forms a continuation of the group and is cohesive in terms of its scale and materials. Aspects of setting which contribute to the importance of the buildings include their immediate physical surroundings and relationships with one another; and their visual presentation along the A547 Rhuddlan Road from which they are experienced as a cohesive group of historic structures. However, traffic noise and movement from the road are intrusive elements that detract from this experience and reduce the understanding of their historically rural wider context.

Toll Bar Cottage



12.5.18 Toll Bar Cottage (ES **Figure 12.1: L8**) is a Grade II Listed Building located c. 30 m south of parcel 1 of the Solar Site. Constructed between 1865 and 1875, it is attributed to architect W.E. Nesfield and forms part of a collection of buildings designed for the Kinmel Estate. The building features architectural details including a jettied gable and decorative timber framing.

12.5.19 Toll Bar Cottage is a designated historic asset of **Medium importance**, with its importance associated with its evidential and historical values as a well-preserved example of mid-19th-century toll architecture linked to the expansion of the turnpike system, and its architectural form as an element of the Kinmel Estate. The setting of the building is intrinsically linked to its function and historical context, positioned directly on the former turnpike road with its principal elevation addressing the passing traffic. The wider agricultural landscape, although broadly representative of that within which the building was constructed and functioned, does not have any direct or meaningful relationship with the asset.

Glan-y-Morfa

12.5.20 Glan-y-Morfa (ES **Figure 12.1: L11**) is a Grade II Listed Building located 130 m south-west of Parcel 5 of the Solar Site (**Appendix H.1**). The building was constructed in the late 18th century as a farmhouse for the Kinmel Estate. It is constructed in handmade Flemish-bond brickwork with a slate roof and end chimneys.

12.5.21 Glan-y-Morfa is a designated historic asset of **Medium importance**. The importance of the building derives from its evidential and historical value as a characteristic example of architectural styles associated with the Kinmel Estate, and as an illustrative component of the estate's historical development. Contributory elements of the building's setting include its contextual relationship with its immediate surroundings, formed by a garden to the south (onto which the building fronts), farmyard and a paddock. Surrounding agricultural land provides a wider functional context to the asset.

Morfa Methodist Chapel

12.5.22 Morfa Methodist Chapel (ES **Figure 12.1: N2**) is a non-designated former chapel located adjacent to Parcel 5 of the Solar Site. The Chapel was built in 1866 in the Gothic style, with a long-wall entry plan and porch. The building is now in residential use.

12.5.23 Morfa Methodist Chapel is non-designated heritage asset of **Low importance**. Its importance derives primarily from its architectural form, reflecting 19th century nonconformist chapel design which is still apparent despite the building's conversion. However, its former communal value as a place of worship is now diminished. The setting of the buildings is defined principally by its immediate curtilage and the road along which it sits, with its principal elevation addressing the road as common for rural chapels. Fields adjacent and to the rear of the chapel form a rural backdrop which emphasises the historical context of the former chapel, but do not have any direct functional associations with the building and nor do they form part of any designed views.

Baseline Evolution

12.5.24 Predicted future developments which could change the setting of historic assets are not easily defined, but will likely include changes to cultivation practices, the change of use of agricultural buildings as well as future developments, such as those consented and planned considered within the Cumulative Assessment (Section 12.10). Based on conclusions of the Cumulative Assessment, and other likely changes, no specific future is forecast that would materially alter the values of the built heritage and historic landscape of the Site and its immediate environs.



12.6 Primary and Tertiary Mitigation

Primary Mitigation

Construction

- 12.6.1 The layout of the Cable Corridor has been designed to ensure that construction impacts of the underground cable(s) within Kinmel Park avoid extant parkland features, thus preserving the current character of the RHPG.

Operation

- 12.6.2 Measures incorporated into the Proposed Development relevant to built historic assets and historic landscapes during operation comprise:
- Siting of the larger components of the Proposed Development notably the substation at the BESS Site, to avoid any impact on the designated historic assets near to the Solar Site;
 - Additional planting to screen the Proposed Development within views from surrounding designated and non-designated historic assets;
 - Retention and reinstatement of historic boundaries, in keeping with the historic character of the landscape setting of surrounding historic assets;
 - Set back of development by c.60-70 m from Grade II Listed Bodoryn Cottages and non-designated historic Bodoryn Chapel and Morfa Methodist Chapel, which has assisted with reducing the changes to the settings of the assets.

Decommissioning

- 12.6.3 Primary mitigation during decommissioning will include the dismantling of all structures within the Solar and BESS Sites, with works planned to avoid further alteration to the settings of nearby historic assets. The land will be reinstated to agricultural use, thereby restoring the existing visual character of the setting of surrounding historic assets.

Tertiary Mitigation

Construction

- 12.6.4 The oCEMP (**Appendix A.5**) will ensure that construction activities for the Cable Corridor within Kinmel Park avoid or minimise any impact upon parkland features, and that the landscape is reinstated to its previous state following installation.
- 12.6.5 Any impacts upon designated and non-designated historic assets arising from changes to settings during construction would be temporary and would not lead to significant effects. However, for the avoidance of doubt, mitigation measures relevant to impacts such as traffic, noise and dust during construction are addressed within the CEMP and will ensure that any effects upon historic assets are avoided or minimised, such that they are not significant or material.

Operation

- 12.6.6 The Landscape Environmental Management Plan (LEMP) will ensure the appropriate management of the proposed landscaping and planting measures to screen the Proposed Development in views from designated and non-designated historic assets.

Decommissioning



- 12.6.7 The DEMP incorporates mitigation measures to traffic, noise and dust during decommissioning works, which would serve to avoid or minimise any temporary effects upon surrounding historic assets.

12.7 Assessment of Likely Significant Effects

- 12.7.1 This section describes the potential effects on historic assets during the construction and operation phases of the Proposed Development. The discussion below takes account of the embedded mitigation measures as described above, when considering potential effects of the Proposed Development. Those components of the Proposed Development that could potentially affect historic assets in each phase are summarised below, as relevant.
- 12.7.2 This section should be read alongside **Appendix H.1**, which contains further detail regarding the sensitivities associated with potential sensitive receptors and likely effects. This information is not repeated here in full, but summarised where potential effects are anticipated.

Construction

- 12.7.3 Construction impacts within the Cable Corridor would include localised ground disturbance for the installation of the underground cable(s) within Kinmel Park RHPG. Effects upon buried archaeological remains within the park, including the potential First World War practice trenches within the Cable Corridor, are considered within **Chapter 7- Archaeology** of the ES. The works will be temporary and limited in nature and the embedded mitigation has ensured that no extant parkland features or structures that contribute to its designed character are located within the areas of disturbance. As a result, the Proposed Development will not cause any permanent change to the appearance or experience of Kinmel Park. Overall, there would be No Impact to this designated historic asset of High importance, and a **Negligible** significance of effect (**Not Significant**).
- 12.7.4 During construction, impacts upon surrounding designated and non-designated historic assets would derive from the presence of machinery, perimeter fencing, and temporary construction compounds, together with associated traffic and noise within the Site and also alongside the surrounding road network. Construction operations are temporary by nature, and the impacts associated with these works would be short-term and limited. This would result in No Impact to the designated historic assets of Medium and High importance and a **Negligible** significance of effect (**Not Significant**).

Operation

- 12.7.5 The presence of infrastructure or landscape planting during the operation phase may cause changes or alterations (beneficial or adverse) to the setting of historic assets, which may affect their value (importance). These impacts are long-term for infrastructure, or may be permanent in respect of planting, for the operational duration of the Proposed Development, but are reversible. Additional operational effects - such as those arising from security lighting, noise, or vehicle movements - are not considered likely to result in significant impacts, consistent with the assessment for the Construction phase above.
- 12.7.6 During operation, the landscape within the Cable Corridor will have been reinstated to its previous condition and no impacts on the character or appearance of Kinmel Park will occur.
- 12.7.7 The potential for the Solar and BESS elements of the Proposed Development to introduce change within the setting of designated and non-designated historic assets which could affect their importance is assessed in detail within **Appendix H.1**, which considered the surroundings and experience of each asset (or asset group, where relevant), the contribution of the Site to their heritage values and potential for adverse (or beneficial) impacts from the Proposed Development. The results are summarised below.

Kinmel Park



- 12.7.8 The Solar Site lies adjacent to Rhuddlan Road, on land which historically formed part of the Kinmel Estate but is now physically and perceptually severed from the main area of Kinmel Park RHPG by the A55. Parcels 4, 5 and 6 of the Solar Site (**Appendix H.1**) lie immediately adjacent to Coed y Drive, the historic approach to the park from the north, however this is now entirely disconnected from the main park. The wooded character of the approach deliberately creates a secluded experience with no views into or out of this part of the park available. Most of the main area of Kinmel Park is also either enclosed by dense tree cover or lies beyond the landform horizon, limiting any sustained visual relationship with the Site. While there are some occasional glimpsed views towards parts of the Park and Kinmel Hall from within the Solar Site, these are heavily filtered by vegetation and not part of any designed or significant view. As a result, the Solar Site does not contribute to the parkland character of Kinmel Park and forms no meaningful part of how the Park is experienced.
- 12.7.9 The BESS Site, located further to the south-east, lies entirely outside the historic estate boundary and is not visible from within Kinmel Park or from any of the designated historic assets it contains. Its location, character, and lack of historical or functional association with the estate mean that it makes no contribution to the importance of any asset and would not result in an adverse impact via change to their setting(s).
- 12.7.10 Kinmel Hall (L2-1), the estate's visual and architectural centrepiece, is oriented away from the Site and separated by mature planting and topography. While the Solar Site may be visible in views from the Hall over the wider landscape and towards the coast, the Solar Site would feature as a peripheral element within these views, which already takes in a modern, altered, primarily agricultural landscape. With the primary and tertiary mitigation measures, such as enhanced vegetation screening, any visibility of the Proposed Development (at the Solar Site) would be very limited, and the landscape will continue to be perceived as rural in character.
- 12.7.11 Morfa Lodge (L2-3), although geographically close to the Solar Site, is similarly separated by modern infrastructure and vegetation, with no intervisibility or remaining functional relationship. The key contextual relationships that Morfa Lodge holds with Coed y Drive and the road along which it sits would be entirely preserved. Other individual assets within the park, including Listed lodges and gates (L2-4 to L2-14) have no visual, spatial or contextual relationship with the Site and would not be affected by the Proposed Development. This is consistent with the conclusions of Cadw and the Conwy Conservation Officer in relation to the consented solar farm north of Rhuddlan Road (Conwy planning application ref. 0/4099) which sits closer to Morfa Lodge than the Proposed Development.
- 12.7.12 The operational phase of the Proposed Development would result in No Impact upon Kinmel Park Grade II* RHPG, an asset of High importance. This would lead to a **Negligible** significance of effect and thus **Not Significant**.

Bodelwyddan Castle

- 12.7.13 The Solar Site is situated over 1 km from Bodelwyddan Castle RHPG, with intervisibility with the park heavily restricted by intervening topography and established woodland. The Solar Site does not feature within the designed experience of the park or any of the principal views from the Castle (L1-1). Similarly, the BESS Site lies outside the estate boundary and key view corridors, with no intervisibility or impact on the Park's spatial or visual coherence. The Proposed Development would not result in any change to any of the elements of the setting of the park and its associated Listed Buildings which contribute towards their importance.
- 12.7.14 The Scheduled First World War Practice Trenches, situated well away from development areas in a wooded part of the park, also holds no relationships with the Site and would be entirely unaffected by the Proposed Development.
- 12.7.15 The operational phase of the Proposed Development would result in No Impact upon Bodelwyddan Park Grade II RHPG and associated historic assets, which are of Medium to High importance. This would lead to a **Negligible** significance of effect and is therefore **Not Significant**.



Bodoryn Cottages and Bodoryn Chapel

- 12.7.16 The Solar Site is located in proximity to the Grade II Listed Bodoryn Cottages and Bodoryn Chapel, with Parcel 3 (**Appendix H.1**) extending to their rear boundaries and Parcels 2 and 4 positioned nearby, separated by Gors Road and Rhuddlan Road. Despite this proximity, the Site does not have any known historical or functional associations with the buildings and is largely screened within views of the cottages from their adjacent road as well as from the buildings themselves. While some parts of the Proposed Development may be seen in views from upper windows to the rear of the cottages, it would be perceived as part of a modern altered landscape. As simple workers' cottages with their principal elevations facing the road, views to the rear would not have been an intentional consideration of their design and do not contribute to the importance of the assets. Likewise, the Solar Site does not form an intentional aspect of the setting of Bodoryn Chapel, which is best perceived from the road.
- 12.7.17 With the primary and tertiary mitigation ensuring that any visibility of the Proposed Development is minimised and the landscape continues to be perceived as fundamentally rural in character, the operational phase of the Proposed Development would have No Impact on the Medium importance Bodoryn Cottages or the Low importance Bodoryn Chapel. This would result in a **Negligible** effect upon the Grade II Listed Cottages and No effect upon Bodoryn Chapel and is **Not Significant**.

Toll Bar Cottage

- 12.7.18 Parcel 1 of the Solar Site (**Appendix H.1**) is located directly opposite Toll Bar Cottage (L8), separated by Rhuddlan Road, a substantial and well-trafficked modern route that preserves the alignment of the historic turnpike with which the cottage had an integral relationship. The cottage's architectural detailing and orientation are deliberately arranged to address the carriageway, reflecting its original function as a toll house. The Proposed Development would have no influence on this associative relationship, which would remain wholly intact.
- 12.7.19 While the Proposed Development would introduce a change to the wider landscape to the north of the road, the Site does not form part of the cottage's immediate or historically functional setting. There is no historic or designed relationship between the building and the land now occupied by the Solar Site. The intervening road and roadside vegetation provide a clear visual separation, with views towards the Site either filtered or incidental in nature. Any visibility of the Site does not represent part of any designed view or intentional spatial relationship that contributes to the importance of the asset. The Proposed Development would not interfere with the principal elevation or diminish the legibility of the cottage's historic roadside presence. The embedded mitigation measures, comprising enhancement of the existing roadside vegetation to visually screen the Proposed Development, would further limit any visibility within the experience of the asset from the road.
- 12.7.20 The Proposed Development would have No Impact on the Medium importance Toll Bar Cottage. This would lead to a **Negligible** effect and is therefore **Not Significant**.

Glan-y-Morfa

- 12.7.21 Parcel 5 of the Solar Site (**Appendix A.9**) is located to the north-east of Glan-y-Morfa, beyond the unclassified road. The farmhouse is oriented southward, with its principal elevation facing away from the Solar Site and towards its associated gardens and agricultural land. As such, the property does not have a functional or visual relationship with the land now forming the Solar Site.
- 12.7.22 The primary aspects of Glan-y-Morfa's setting that contribute to its importance—namely, its orientation towards its own farmyard and gardens—would not be altered by the Proposed Development. The intervening road and existing vegetation limit any visibility between the asset and the Site, and this will be further reduced by the primary and tertiary mitigation measures (i.e. additional planting and retention of the current boundaries and thus historic field pattern). While the Proposed Development may introduce changes to the broader



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landscape, these would not affect the key elements that define Glan-y-Morfa's historic character and importance.

- 12.7.23 The Proposed Development would result in No Impact on the Medium importance Glan-y-Morfa. This would produce a **Negligible** effect and is thus **Not Significant**.

Morfa Methodist Chapel

- 12.7.24 The Solar Site (**Appendix A.x**) lies immediately to the north and south of Morfa Methodist Chapel. However, the fields within the Site do not have a historical, visual, or functional connection that contributes directly to the chapel's heritage importance, which relates principally to its architectural qualities and its roadside presence.
- 12.7.25 The Proposed Development would not alter the understanding of the building as a former chapel, as understood within views the road. The primary and tertiary mitigation measures, including the set back of the solar farm and maintenance of the fields closest to the asset as green space with additional planting, will ensure that a sense of the current agricultural backdrop will be maintained. Any visibility of the Proposed Development within views of and from the asset would be limited and would not affect the key elements of its historic and architectural value, or the understanding of its former historic function as a chapel.
- 12.7.26 The Proposed Development would result in No Impact on the Low importance Morfa Methodist Chapel. This would equate to **No Effect** and is thus **Not Significant**.

Decommissioning

- 12.7.27 There would be temporary change to the setting of historic assets during decommissioning, resulting from the use of machinery and traffic movements to disassemble the components of the Proposed Development. The impacts and effects will be the same as those reported for the construction phase of the Proposed Development. Following the completion of the decommissioning phase, the landscape would likely be returned to its original use (although with planting/biodiversity mitigation and enhancement areas retained where possible). As such following decommissioning no adverse magnitude of effect is anticipated upon those historic assets (No Impact). Any changes within setting as a result of the Proposed Development would be reversed, with 'adverse' elements within their setting removed and returned to positive thus, again, contributing to and enhancing their importance.

12.8 Secondary Mitigation and Enhancement

Construction

- 12.8.1 No significant effects upon historic buildings and historic landscapes have been identified during construction, and no additional mitigation is therefore proposed. The CEMP provides tertiary mitigation to minimise any effects during this phase.

Operation

- 12.8.2 As no significant effects upon historic buildings and historic landscapes have been identified during operation, no additional mitigation measures are proposed in response to those not significant effects. The tertiary mitigation measures, including the LEMP, will ensure that proposed landscaping/planting measures are appropriately managed.

Decommissioning

- 12.8.3 No significant effects upon historic buildings and historic landscapes have been identified during construction, and no additional mitigation is proposed. The DEMP incorporates tertiary mitigation to minimise any temporary effects during this phase.



12.9 Residual Effects

Construction

- 12.9.1 Effects upon designated and non-designated historic assets during construction have been assessed, in the worst-case scenario, as Negligible (not significant) and no additional mitigation is proposed beyond those primary and tertiary mitigation measures set out above. The residual effect therefore remains **Negligible** and **Not Significant**.

Operation

- 12.9.2 The primary and tertiary mitigation measures built into the Proposed Development minimise the changes to surrounding designated and non-designated historic assets and the historic landscape resource during operation. No secondary mitigation is proposed, and the effects have been assessed, in the worst-case scenario, as **Negligible** (not significant) and thus the residual effect remains as such, **Not Significant**.

Decommissioning

- 12.9.3 Effects on designated and non-designated historic assets during decommissioning have been assessed as Negligible (not significant), and no secondary mitigation is proposed beyond the primary and tertiary measures outlined above. The residual effect is therefore assessed as **Negligible** and **Not Significant**.

12.10 Cumulative Effects

- 12.10.1 The assessment of cumulative effects considers the construction and operation impacts of the Proposed Development together with other existing, consented or foreseeable developments. The committed developments set out in **Table 12.6** are considered to have the potential for cumulative effects when considered alongside the Proposed Development due to their location within proximity to the Site and the type of development.

Table 12.6: Committed Development list

Site Address and Application Reference Number	Description	Decision	Distance to from site
Land immediately north of A547 Rhuddlan Road Towyn Conwy. 0/40999	Installation of ground mounted photovoltaic (PV) solar arrays to provide 24MW generation capacity together with inverter buildings, internal maintenance access track, landscaping, fencing and ancillary infrastructure.	Approved with conditions	Immediately adjacent and partly overlapping with Solar Site
Awel y Mor Offshore Wind Farm EN010112	Wind farm and associated development	Approved with conditions	Elements associated with construction and operation fall within the BESS Site
Mona Offshore Wind Farm EN010137	Wind farm and associated development	Approved with conditions	Elements associated with construction and operation fall within the BESS Site
St Asaph DNS CAS-01392-D2TSF3	Provision of photovoltaic solar farm and ancillary infrastructure	Scoping been submitted	Approximately 800m south-east of BESS Site



Site Address and Application Reference Number	Description	Decision	Distance to from site
Land Adjacent to Maes Owen, Abergele Road 40/2024/1079/PF	49 dwellings with roads and open space	In planning – decision pending	Approximately 500m south-east of Solar Site
Land at Bryn Morfa 40/2023/0627	31 dwellings with access roads	Approved	Approximately 600m south-east of Solar Site

Construction

12.10.2 Cumulative effects upon built and historic landscape assets during construction, as arising through alterations to their settings, would be limited and temporary, resulting in No Impact and thus a **Negligible** and **Not Significant** effect.

Operation

12.10.3 The assessment of the Proposed Development concluded that the anticipated effects upon built heritage and historic landscape would be **Negligible** and **Not Significant**. As such, any identified effects from the cumulative schemes would not be material to the assessment of the Proposed Development. In the case of the operational solar farm north of Rhuddlan Road (0/40999) which partly overlaps the Solar Site, the heritage assessment submitted with the application did not identify any harm to designated historic assets, including Kinmel Park and Morfa Lodge, as a result of the scheme. As per the Solar Site, the land within the scheme does not contribute to the importance of any of the surrounding historic assets. The consented scheme originally included a number of fields within the Solar Site (adjacent to the north and east of the operational solar farm) however these were not built out. As the permission was implemented it remains extant, such that the remainder of this consented area could, in principle, be built out without the need for further approval. This is noted within the cumulative assessment to reflect the planning status of the site, although it would not materially alter the conclusion that the overall effect on the built heritage environment remains Not Significant.

12.10.4 The Mona Offshore Wind Farm (EN010137) and Awel y Mor Offshore (EN010112) schemes interact with the BESS Site (primarily in terms of underground cabling), which was not found to have any relationship with any surroundings designated and non-designated historic assets due to distance and intervening screening. These schemes are similarly located at sufficient distance and separated by built form and vegetation as to have no effect upon surrounding historic assets.

12.10.5 The Maes Owen (40/2024/1079/PF) and Bryn Morfa (40/2023/0627) schemes comprise residential developments at the east and west fringes of the existing settlement at Bodelwyddan. Both of these developments are located at considerable distance from the Solar and BESS Sites, as set out in Table 12.6, with no visual relationship due to screening provided by intervening built form and vegetation. The schemes do not have any interactions or known association with historic assets within the vicinity of the Site. No cumulative effects have therefore been identified in relation to these schemes. St Asaph (DNS CAS-01392-D2TSF3) is similarly located at sufficient distance from the Site as to not share any associations with nearby historic assets and no cumulative effects are identified.

Decommissioning

12.10.0 Cumulative effects upon built and historic landscape assets during decommissioning would arise through associated noise and dust and increased traffic within their settings. These



effects would be limited and temporary, resulting in No Impact and thus a **Negligible and Not Significant** effect.

12.11 Monitoring

12.11.1 No significant residual adverse effects have been identified in relation to built heritage and historic landscape. As such, no additional monitoring is required beyond the embedded mitigation measures set out in the LEMP which will ensure ongoing management of the proposed planting.

12.12 Consideration of Climate Change

12.12.1 Based on the UKCP18 projections identified in relation to the Site, climate change is expected to result in increased frequency and severity of extreme weather events, including heavier rainfall, more frequent storms, drought conditions, and temperature fluctuations. These evolving climatic conditions have the potential to accelerate the physical deterioration of historic building fabric (e.g. masonry erosion, timber decay, damp ingress) and impact the character and ecological balance of historic landscapes through erosion of earthworks, and damage to landscape features such as boundary walls, parkland trees, and water management systems.

12.12.2 The impact of climate change on built heritage and historic landscape is therefore considered indirect and long-term, with a Negligible to Minor Adverse effect depending on future adaptation and stewardship. The Proposed Development is not anticipated to increase or accelerate these risks. However, it is acknowledged that broader environmental change may alter the baseline conditions under which importance is experienced, and proactive management may be desirable in preserving the integrity and legibility of historic assets over time.

12.13 Conclusions

Introduction

12.13.1 An assessment of the potential effects of the Proposed Development on built heritage resource has been undertaken. This considered historic buildings, structures and monuments and historic landscapes, including designated historic assets such as Listed Buildings, Scheduled Monuments, Registered Parks and Gardens and Registered Historic Landscapes. The assessment drew on the results of desk-based research and has been undertaken in line with relevant policy and guidance, including Planning Policy Wales (Edition 12), Technical Advice Note 24: The Historic Environment, and Cadw's Conservation Principles and Setting of Historic Assets in Wales.

12.13.2 Several designated historic assets are located in the landscape surrounding the Site, including Kinmel Grade II* Registered Historic Park and Garden, through which the Cable Corridor partly runs, Bodelwyddan Castle Grade II Registered Historic Park and Garden, and a number of Listed Buildings. In addition, two non-designated heritage assets comprising Morfa Methodist Chapel and Bodoryn Chapel are located in proximity to the Solar Site. The importance of these designated and non-designated historic assets primarily derives from their physical form, including designed layout and historic fabric, as well as their immediate settings in the case of the Listed Buildings. The Site lies within their wider rural context but does not form a key element of their importance. In the case of Kinmel Park, the section of Cable Corridor within the park does not contain any extant parkland features or elements which directly contribute to the experience of its importance.

Construction and Decommissioning

12.13.3 During construction, installation of the cable within Kinmel Park Registered Historic Park and Garden (RHPG) would involve localised, temporary ground disturbance, but no permanent change to the park's appearance or character is expected. Embedded mitigation would ensure



that no extant parkland features or structures contributing to its designed character will be affected. Wider construction and demolition activity, such as machinery, fencing, and traffic, would be short-term and carefully managed. As such, no significant effects would occur to built and historic landscape assets during these phases of the Proposed Development. As set out in the submitted Arboricultural Impact Assessment, master planning of the Proposed Development (notably the Cable Corridor) has been informed by arboricultural recommendations and as such, with appropriate mitigation, would not result in the removal of any trees within the Kinmel Park RHPG.

Operation

- 12.13.4 During the operational phase, the Proposed Development would not result in any harm to the importance of nearby designated and non-designated historic assets. Kinmel Park Registered Historic Park and Garden and its associated Listed Buildings, including Kinmel Hall and Morfa Lodge, are visually and physically separated from the Solar Site by topography, woodland, and infrastructure. The Site does not form part of any designed views or intentional spatial relationships and would remain a peripheral feature within a modern agricultural landscape. Similarly, Bodelwyddan Park RHPG and its associated assets lie over 1 km away, with no intervisibility or contextual relationship, and would experience no change to their importance.
- 12.13.5 The Grade II Listed Bodoryn Cottages, Toll Bar Cottage, and Glan-y-Morfa and the non-designated Morfa Methodist Chapel and Bodoryn Chapel are in closer proximity to the Solar Site, but are also visually screened, separated by roads, and have no functional or historical association with the Site. Their key heritage values, including architectural form, orientation, and position along historic routes or alongside associated farmyards, would remain unaffected. With embedded mitigation in place to minimise visibility of the Proposed Development, no significant effects on the built heritage resource are anticipated and the provisions of local and national planning policies would be met.



13 Other Issues Considered

13.1 Introduction

- 13.1.0 This Chapter provides information in relation to the environmental disciplines considered throughout the EIA process. This Chapter, titled 'Other Issues Considered', aims to address topics that have been requested to be scoped into the ES through consultation during the EIA Scoping process, however, do not require full standalone chapters. This Chapter will demonstrate that minor or non-significant environmental effects have been acknowledged.
- 13.1.1 This Chapter draws upon assessment prepared to support the planning application which, where referenced, are included within the appendices of this ES.

13.2 Population and Human Health

- 13.2.0 A Population and Human Health Statement has been prepared by Stantec and is appended as **Appendix I.1** to this ES.

Baseline

Population

- 13.2.1 The population within the local study area (LSA), was 31,137 whilst that of the county Denbighshire and Conwy was 95,817 and 114,741 respectively and 3,107,493 in the country of Wales as a whole (ONS, 2025a).
- 13.2.2 The LSA's population under the age of 15 accounted for 15.6% of their total population in comparison to 17.6% in Denbighshire and Wales alike and 16% for Conwy. The LSA has a similar working age population (aged 16-64) (55.3 %) to the whole of Denbighshire (57.6%) and Conwy (56.6%), however, all three are lower than the national average (61.1%).
- 13.2.3 The LSA has a higher percentage of people aged 65+ (29.2%) compared to the Denbighshire (24.8%), Conwy (27.3%) and national (21.3%) averages (ONS, 2025a). 96.4% of the LSA population identifies as White, which is similar to the Denbighshire as a whole (96.5%) and Conwy (96.9%), but higher than the national (81.0%) average.
- 13.2.4 The second largest ethnic group is Asian, Asian British or Asian Welsh (2%), which is marginally higher than the rest of Denbighshire (1.7%) and Conwy (1.4%) but lower than the national (2.9%) average (ONS, 2025b).
- 13.2.5 The most common religion in the LSA is Christianity (52.7%), which is higher than the rest of Denbighshire (49.3%), Conwy (50.8%) and Wales (43.6%) (ONS, 2025c).
- 13.2.6 In the LSA, 25.3% of the population is disabled under the Equality Act which is slightly higher than the rest of Denbighshire (23.3%), Conwy (22.6%) and the national (21.6%) rate (ONS, 2025d).

Health

- 13.2.7 The LSA population assessed their general health to be slightly lower than the rest of Denbighshire, Conwy and national averages in Wales. 74.7% of the LSA population rated their health as either 'good' or 'very good', while only 8% rated their health as 'bad' or 'very bad' (ONS, 2025e). The majority of physical health baseline standards within Denbighshire are worse than the national averages, however, are about average in Conwy.
- 13.2.8 Average life expectancy at birth in Denbighshire for males in 2021-23 was 77.6 years, which is similar than that in Conwy of 78.7 years and the national average of 78.0 years. Average life



expectancy for females in the same period was 80.9 years, which is slightly lower than for Conwy at 82.4 years and the national average of 82.0 years (Digital Health and Care Wales, 2025).

- 13.2.9 Wider determinants of health include active travel, physical activity and access to PRowS. The LSA on average had lower than national averages use of active travel to work and Denbighshire as a whole had lower than national average proportion of people reaching recommended exercise minutes each week.

Mitigation

Construction and Operation

- 13.2.10 Mitigation measures relevant to the population and human health already outlined within the construction and operation phases of **Chapter 6 – Flood Risk and Water Resources**, **Chapter 8 – Climate Change**, **Chapter 9 – Ground Conditions and Contaminated Land**, **Chapter 10 – Biodiversity** and **Chapter 11 – Landscape and Visual**, are the mitigation measures to be adopted.

Decommissioning

- 13.2.11 An outline DEMP has been included with the planning application (**Appendix A.6**) and will present similar measures to the CEMP to encourage use of lower carbon methods. It would not be appropriate to specify such requirements now as the decommissioning environment beyond the 40-year operation period of the Proposed Development is likely to be considerably different to today.
- 13.2.12 At the design stage, materials should be selected to increase recyclability and to minimise the creation of waste, where reasonably practicable. This will be secured through the DEMP.

Assessment of Effects

Construction

- 13.2.13 The impact on existing and neighbouring residents of the Site during the construction phase of the Proposed Development ranges from Negligible to Moderate Adverse, which is considered **Significant**, without mitigation. The impact on construction workers on the Site during the construction phase of the Proposed Development ranges also from **Negligible to Moderate Adverse**, which is considered **Significant**, without mitigation.
- 13.2.14 The impact on children and young people; older and elderly people; individuals at with or at risk of health conditions; PRow users as well as people experiencing higher deprivation during the construction phase of the Proposed Development ranges from **Not Significant to Significant** at the Site level only prior to mitigation.

Operation

- 13.2.15 The impact on existing and neighbouring residents of the Site during the operational phase of the Proposed Development ranges from **Minor Significance**, which is **Not Significant**, to **Beneficial** which is considered **Significant**.
- 13.2.16 The impact on future users of the Site (e.g. workers) during the operational phase of the Proposed Development ranges from Beneficial, which is considered **Significant**, to **Minor Adverse**, which is **Not Significant**.
- 13.2.17 The impact on PRow users around the Site during the operational phase of the Proposed Development ranges from **Minor Significance**, which is **Not Significant**, to **Beneficial** which is considered **Significant**.



- 13.2.18 The impact on children and young people; older and elderly people; individuals at with or at risk of health conditions and those experiencing higher levels of deprivation during the operational phase of the Proposed Development ranges from **Beneficial**, which is considered **Significant**, to **Minor Adverse**, which is **Not Significant**.

Decommissioning

- 13.2.19 The impact on existing and neighbouring residents of the Site during the decommissioning phase of the Proposed Development ranges from **Negligible** to **Minor Adverse**, which are both **Not Significant**.

- 13.2.20 The impact on future users of the Site during the decommissioning phase of the Proposed Development ranges **Negligible** to **Minor Adverse**, which are both **Not Significant**.

- 13.2.21 The impact on children and young people; older and elderly people; individuals at with or at risk of health conditions, those experiencing higher levels of deprivation and PRow users during the decommissioning phase of the Proposed Development ranges **Negligible** to **Not Significant**.

13.3 Agricultural Land

- 13.3.0 An ALC Survey was undertaken and an associated report prepared by LRA, which has been provided in **Appendix I.2**.

Baseline

- 13.3.1 The Solar Site consists of 148 ha of ALC Subgrade 3b and 11.3 ha of Subgrade 3a land, with the remaining 6.3 ha of land on the Solar Site classified as 'Other Land' which may include watercourses and ditches. The Solar Site thus contains a small portion of land considered BMV (Subgrade 1 to 3a). Given the small portion of BMV land which is distributed around the Solar Site in a complex pattern across six different fields and comprises a range of soil types it would be very hard to use any differently to the non-BMV land.
- 13.3.2 The BESS Site comprises solely Subgrade 3b land, at 6.5 ha. The BESS Site therefore does not include any land regarded as BMV.

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- 13.3.3 LQAS noted with the Scoping Direction (**Appendix A.3**) that the full ALC Survey results were not included within the Scoping Report submitted on 19 December 2024 and the results were therefore not validated.
- 13.3.4 The ALC Report dated 11 July 2025, provided in **Appendix I.2**, was sent to LQAS and validated on 29 July 2025, which fulfils the requirements of the Scoping Direction.

13.4 Material Assets and Waste

- 13.4.0 During the construction and decommissioning period, measures will be put in place to minimise waste and opportunities for recycling maximised, including through implementation of the CEMP and DEMP, an outline version of which is appended to the ES (**Appendices A.5 and A.6** respectively). All relevant recycling and waste regulations and policy will be followed at all times which will include the Waste and Electrical and Electronic Equipment Regulations 2013/10. Construction and decommissioning waste will be managed and minimised in line with the Waste Hierarchy.
- 13.4.1 The most significant generation of waste from the Site will be from site clearance and excavation activities. The potential impacts associated with waste arising from the



construction and decommissioning period of the Proposed Development have been assessed and include the impact on transport, dust and odour, as well as noise.

- 13.4.2 Construction and decommissioning of the Proposed Development will be approached to minimise the creation of waste and, where possible, maximise the use of alternative materials with lower embodied carbon. Measures implemented to reduce waste during construction and decommissioning are detailed within the oCEMP (**Appendix A.5**) and oDEMP (**Appendix A.6**).

13.5 Major Accidents and Disaster

- 13.5.0 An Outline Battery Safety Management Plan (OBSMP), in addition to a FCA and Proposed Drainage Strategy, have been prepared to in part address major accidents and disaster surrounding the Proposed Development. These are provided in **Appendix I.3, B.1 and B.3** respectively.

Battery Energy Storage System

- 13.5.1 Consultee comments, in relation to the Scoping Report, received from NRW, DCC, Environmental Public Health Services Wales (EPHSW) and CCBC noted BESS fire management was to be scoped into the ES to include appropriate mitigation measures to ensure that an isolated fire would not become widespread and lead to major incident.
- 13.5.2 As set out in the OBSMP, preliminary safety hazard identification and analysis have been conducted based on comparable energy storage systems utilising Lithium Ferrous Phosphate (LFP) battery technology, which identified any likely hazards associated with the BESS and potential control measures for this.
- 13.5.3 The BESS Site has been selected due to its minimal environmental constraints and screening away from nearby residences, improving their safety. Prior to the construction of the Proposed Development, Emergency Plans and Risk Assessments will be developed in line with National Fire Chiefs Council (NFCC) Grid Scale BESS planning – Guidance for Fire and Rescue Services (FRS) [Ref. 2], to outline how the operator is to respond in the event of an incident or any accident scenarios. This will be developed in an iterative manner in parallel to technical safety requirements.
- 13.5.4 The Site will also be maintained to be kept free of vegetation, litter and any combustible materials to reduce the risk of fire spreading.
- 13.5.5 The mitigation measures are expected to reduce the associated risks to a level that is acceptable.
- 13.5.6 The OBSMP, as provided in **Appendix I.3**, fulfils the requirements of the Scoping Direction.

Pollution Prevention

- 13.5.7 NRW noted within the Scoping Direction that adequate measures for the containment and removal of contaminated fire water are to be outlined along with drainage and emergency plans.
- 13.5.8 Mitigation measures include:
- Use of watertight containers fabricated in accordance with Ingress Protection 68 standards;
 - Control of temperature and humidity within the batteries through an air or liquid cooling system;
 - Housing batteries in containers with an Environmental Control Unit;



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- Fitting batteries with a Battery Management System that enables shut down in the event of temperature rises; and

13.5.9 Installation of an automated fire suppression system with the BESS units.

13.5.10 The FRA and Proposed Drainage Strategy, as well as **Chapter 6- Flood Risk and Water Resources** of this ES, fulfils the requirements of the Scoping Direction in relation to pollution prevention from potential fires on the BESS Site.

Solar PV

13.5.11 The Proposed Development will utilise solar panels that are confirmed to be free from per- and polyfluoroalkyl substances (PFAS). PFAS are a group of synthetic chemicals known for their persistence in the environment and potential to leach over time due to wear and tear. In response to the scoping direction issued by PEDW, the Applicant confirms that no PFAS-containing materials will be used in the solar panels, thereby eliminating the risk of PFAS leaching into the local environment.

13.6 Utilities

13.6.0 SPEN raised comments within the Scoping Direction that the impact of the Proposed Development on existing network is to be explained, including how this is to be managed and mitigated. This is explained in Section 3.4 of the ES.

13.6.1 Consultation is ongoing and SPEN have indicated that any remaining concerns can be addressed through the provision of a method statement and a suitably worded planning condition to secure final design details in addition to a separate agreement for asset protection measures.

13.7 Electromagnetic Fields

13.7.0 A High-Level Electromagnetic Field Assessment has been prepared by Pager Power and is provided in **Appendix I.4**.

13.7.1 The Scoping Direction (**Appendix A.3**) issued by PEDW stipulated that the Scoping Report provided (**Appendix A.2**) did not consider the impacts from electromagnetic fields on factors such as human health, ecology, communication and utilities, which are required to be addressed as part of the ES.

13.7.2 All electrical equipment emits electric and magnetic radiation. Power cables produce both electric and magnetic fields which can potentially affect human health. Radiation from underground cables is generally less than radiation from overhead powerlines because emissions from adjacent conductors within a cable tend to cancel each other out. Whilst underground cabling usually results in negligible electric field above ground, it may result in significant magnetic field dependent on the current in the conductors.

13.7.3 The High-Level Electromagnetic Field Assessment suggests maximum electromagnetic radiation levels from the proposed cables underground may exceed reference levels and a 5 m clearance from dwellings and workplaces within 50 m of the cabling will mitigate against significant effects to human health.

13.7.4 The radiation from transformers and PV Inverters will be lower due to the protective enclosures and compliance with electromagnetic disturbance standards. Radiation from the substation and BESS will not be significant as they are located over 50 m away from any dwellings or workspaces. For users of the PRoWs within the vicinity, radiation effects will remain minimal due to their transient exposure and the fact that there is a buffer of approximately 60 m from the PRoW to the east of the Solar Site and the nearest PV panel.



- 13.7.5 The High-Level Electromagnetic Field Assessment (**Appendix I.4**), submitted alongside the ES, fulfils the requirements of the Scoping Direction in relation to electromagnetic fields.



14 Schedule of Mitigation and Monitoring

14.1 Introduction

14.1.0 This Chapter of the ES presents a summary of the mitigation and monitoring measures identified by the specialist environmental studies in the ES. Full details can be found in the respective ES chapters.

14.1.1 Schedule 4, part 1 of the EIA Regulations require an ES to include:

“A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.”

14.1.2 The mitigation and enhancement measures included in this ES fall into one of four categories:

- Measures incorporated into the Proposed Development;
- Measures incorporated into the Detailed Design;
- Measures through controls on construction procedures; and
- Measures through controls on post-construction procedures.

14.1.3 **Table 14.1** outlines a topic-by-topic summary of the key issues addressed by the ES and the mitigation measures identified. The mitigation measures are separated into the above categories.

14.2 Implementation of Mitigation Measures

14.2.1 The Applicant anticipates that, where appropriate, PEDW will attach conditions to the planning permission to ensure commitment to these mitigation measures.

14.3 Review Procedure

14.3.1 The construction programme is assumed to commence in late 2027 / early 2028 (subject to planning determination timescales) and be completed in 2029. It is recognised that environmental standards and legislation that currently apply to the Proposed Development may change during this period. In light of this, the Applicant intends to undertake regular reviews of the Proposed Development, to ensure that best practice is being followed. The review process will be iterative and ongoing, so that new information is identified at an early stage and incorporated into the Proposed Development.

14.3.2 Construction techniques will, where practicable, be updated when new techniques are devised. This would also apply to monitoring of the works, ensuring that effective mitigation measures are used to minimise disturbance to surrounding receptors. The Applicant has prepared an oCEMP and an oECMP which accompany this application. These documents set out the general methods and principles of managing environmental and ecological issues during the construction works, based on current best practice and legislation. Should consent be granted, then a detailed CEMP and ECMP would be prepared and submitted to the LPAs for approval prior to works commencement on site. The detailed CEMP and ECMP would be prepared in accordance with the principles within the approved oCEMP and ECMP and with the latest best practice and legislation applicable at that time.



Table 14.1: Summary of Mitigation and Monitoring Measures

ES Chapter / Topic	Likely Significant Effects	Mitigation Measures
1) Measures incorporated into the Proposed Development		
<i>Flood Risk and Water Resources</i>	Flood risk posed to infrastructure	• Locate BESS and substation compound in Flood Zone 1 and outside of areas of risk from other sources • Utilise tracker panels and raise them above the design and flood levels, including breach • Locate water-sensitive equipment (containerised infrastructure) in areas of lowest flooding (where possible) • Raise water-sensitive equipment by 500mm above the ground using pads or plinths • Make the water-sensitive equipment watertight, subject to procurement processes.
	Management of runoff from hardstanding areas	• Locate all infrastructure at least 8m from Main Rivers and 5m from Ordinary Watercourses • Use permeable surfacing for the substation, access tracks and construction compounds • Direct rain falling on isolated containers to their gravel bases and into the ground • Design the gravel bases to have sufficient volume to store the 12-hour duration design rainfall event • Utilise a formal drainage strategy for the concentration of hardstanding at the BESS compound to limit runoff to the nearby watercourse as close to Qbar rates as possible
	Blockage or failure of proposed drainage assets	• Embed a maintenance routine in accordance with the recommendations of the Ciria SuDS Manual.
	Risk of BESS fires releasing contaminants to the water environment	• Follow the recommendations of the OBSMP • Construct the BESS Site in accordance with NFCC guidance • BESS units to be watertight and be 'ingress protection' rated subject to procurement • Utilise a battery management system • Install a penstock chamber in the gravel base beneath the BESS units to allow it to be shut off if fire suppression water mobilises contaminants • Gravel base to be limestone-based which would neutralise acids in the smoke plume, in the very unlikely event they are released
	New watercourse vehicular crossings affecting watercourse hydromorphology	• Utilise or improve existing crossings.
	Watercourse cable crossings impacting hydromorphology	• Minimise the number of crossings • Utilise trellising or HDD crossings to minimise impact on watercourses
	Cable laying	• Route is to follow existing tracks or roads wherever possible • Use shallow trenching • Follow BRE Agricultural Good Practice Guidance
	Maximise the safety of operatives	• Proposed Development to be remotely operated and therefore only planned and intermittent visits for maintenance are required • Utilise a Flood Emergency Plan, which would be secured via planning condition, that prevents access while a flood



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ES Chapter / Topic	Likely Significant Effects	Mitigation Measures
		warning or flood conditions are in place
<i>Archaeology</i>	Displacement and removal of known and potential buried archaeological remains of Negligible or Low importance (including agricultural features) during construction activities associated with mounting of solar PV arrays (piles).	Removal of assets from plough damage, outweighing any low-level harm.
	Displacement and removal of known and potential buried archaeological remains of Medium importance (including prehistoric and Roman remains) during construction activities associated with mounting of solar PV arrays (piles).	- Removal of assets from plough damage, outweighing any low-level harm (depending on sensitivity of remains to piling). - Siting of elements where greatest ground impacts would occur away from known locations of more sensitive archaeological remains (for example, containerised inverters and 33kV sub-distribution switchroom). The final siting of these elements and therefore the final proposed layout (to be submitted with the DNS application later this year) will be informed by the results of the archaeological evaluation which is currently underway.
<i>Ground Conditions and Contaminated Land</i>	Human Health (on-Site) exposure to potential contamination through ground disturbance	Layout optimisation of the Proposed Development to avoid sensitive features / receptors, as far as is practicable, such as identified sources of potential contamination
	Human Health (off-Site) exposure to potential contamination through ground disturbance	
	Mobilisation of existing potential contamination through ground disturbance impacting upon surface water	
	Mobilisation of existing potential contamination through ground disturbance impacting upon groundwater	
	Damage to minerals resource	Layout optimisation of the cable route (which necessitates a 750mm wide trench) within the Cable Corridor (10 m wide) to avoid, as far as is reasonably practicable, the St. George's Quarry buffer zone



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ES Chapter / Topic	Likely Significant Effects	Mitigation Measures
	Damage to structures resulting from land instability hazards	Layout optimisation of the Proposed Development to locate structures away from areas of potential land instability hazards, as far as is practicable, such as compressible ground (e.g., alluvium and peat), steep slopes, mine entries etc.
<i>Biodiversity</i>	Designated Sites, Habitats and species	- Retention and buffering of habitats of value - Provision of suitable buffers (5 m from top of bank) from retained ditches supporting water vole populations
<i>Landscape and Visual</i>	Landscape character and visual receptors	- Set back of development of Solar Site away from residential receptors - The Proposed Development has been sited within existing field parcels, on intensively farmed land to avoid high-value habitats and sensitive ecological corridors - Built form offset from ditches, hedgerows and woodland to allow adequate buffer for management
<i>Built Heritage</i>	Temporary changes to experience of Kinmel Park from construction activities within Cable Corridor	The layout of the Cable Corridor has been designed to ensure that construction impacts within Kinmel Park avoid extant parkland features, thus preserving the current character of the RHPG.
	Changes to setting of Listed Buildings, Registered Historic Parks and Gardens and non-designated buildings during operation	- Vegetation planting to enhance screening - Siting of most visible elements (BESS and substation) to the BESS Site, and therefore away from designated historic assets - Set back of solar panels from Grade II Listed Bodoryn Cottages to provide a physical and visual buffer and reduce impacts upon setting.
2) Measures to be incorporated into the Detailed Design		
<i>Flood Risk and Water Resources</i>	Flood risk posed to containerised infrastructure in the Solar Site	- Consider using be 'ingress protection' rated watertight water-sensitive equipment containers - Embedding operational procedures to enable shut down of units in advance of, or during, flooding to minimise damage caused
<i>Archaeology</i>	Displacement and removal of known and potential buried archaeological remains of Negligible, Low and Medium importance during construction activities associated with on-site cabling, access tracks, compounds.	Design measures to avoid areas of complex/sensitive remains where feasible
<i>Ground Conditions and Contaminated Land</i>	Human Health (on-Site) exposure to potential contamination through ground disturbance	Intrusive ground investigations and assessment will be undertaken prior to construction. The results of the ground investigation will be used to inform the geotechnical and geoenvironmental elements of the design of the Proposed Development



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ES Chapter / Topic	Likely Significant Effects	Mitigation Measures
	Human Health (off-Site) exposure to potential contamination through ground disturbance	
	Mobilisation of existing potential contamination through ground disturbance impacting upon surface water	- At trenchless crossings, and where otherwise indicated in the ES, a Hydrogeological Risk Assessment (HRA) will be undertaken post-consent to assess the specific risks to groundwater and groundwater receptors (including the risk of breakout of drilling fluids, where appropriate) at those locations and identify any additional mitigation or remediation that may be required. The nature and scope of any mitigation or remediation will be agreed with the Environment Agency or other stakeholders, as appropriate. The HRA will be informed by the results of the ground investigation undertaken in the area of the proposed trenchless crossings - Foundation Works Risk Assessment (FWRA) will be undertaken for the BESS, and any other structures requiring deep foundations / piling. The FWRA(s) will be undertaken post-consent and will be informed by the results ground investigation undertaken in the area of the proposed structures for which FWRA is required. - Intrusive ground investigations and assessment will be undertaken prior to construction. The results of the ground investigation will be used to inform the geotechnical and geoenvironmental elements of the design of the Proposed Development
	Mobilisation of existing potential contamination through ground disturbance impacting upon groundwater	
	Damage to structures resulting from land instability hazards	
<i>Biodiversity</i>	Designated Sites, Habitats and species	- Creation of new hedgerows and trees across the Site to enhance connectivity for wildlife - Enhancement of retained habitats across the Site - Ecological Mitigation and Enhancement Area designed to provide enhanced habitat for a range of species, notably breeding and wintering birds
<i>Landscape and Visual</i>	Landscape character and visual receptors	- Internal networks and hedgerows are retained and enhanced - Existing field breaks have been prioritised to accommodate access tracks - An outline Landscape and Ecology Management Plan (oLEMP) accompanies this application, and a detailed Landscape and Ecology Management Plan (LEMP) can be secured by a suitably worded planning condition to set out planting schedules for planting native trees and hedgerows and methods of grassland enhancement.
<i>Built Heritage</i>	Temporary changes to settings of Listed Buildings, Registered Historic Parks and Gardens and non-designated buildings from construction and decommissioning activities	The submitted o CEMP and oDEMP include measures to minimise noise, dust and traffic movement during construction and decommissioning. If consent is granted, then a detailed CEMP and DEMP would be submitted for approval by the LPA(s) prior to construction and commissioning, respectively, secured via planning conditions.
	Temporary changes to experience of Kinmel Park	Preparation of a CEMP, to be secured via a planning condition and prepared in accordance with the submitted oCEMP which will include measures to avoid or minimise any impact upon parkland features and reinstatement of the land within the Cable Corridor to its previous state following installation, in addition to measures to minimise



ES Chapter / Topic	Likely Significant Effects	Mitigation Measures
	from construction activities within Cable Corridor	noise, dust and traffic movement.
<i>Climate Change</i>	Effects of climate change on infrastructure	- BESS will be equipped with HVAC for cooling to protect the infrastructure from degradation caused by overheating. - Solar panels can be protected from extreme wind events through design mechanisms such as wind-resistant mounting systems and choosing specific angles and orientations to reduce potential impacts. Landscaping on Site will additionally reduce the impacts of high wind events on the infrastructure.
	Effects of climate change on future site users	Work practices for maintenance workers will be adapted through mechanisms such as timing maintenance around storms and utilising PPE more frequently.
	Effects of climate change on the natural environment (Ecology, Landscape and Planting)	- Measures in the LEMP will improve the long-term resilience of habitats and species within the Site and managing areas that may be affected by climate change impacts. - Species for the proposed planting within the Site should include those tolerant to higher temperatures, drought resistant and need less irrigation. This will increase resilience and reduce pressure on water supply during a drought.
	Effects of climate change on flood risk and sea level rise	The Proposed Development will be designed to be resilient to management of storm water and extreme rainfall events. SuDS will be incorporated in the Proposed Development to reduce flood risk.
	Greenhouse gas emissions	No mitigation measures are proposed as the nature of the Proposed Development is to reduce GHG emissions associated with renewable energy generation and therefore significant beneficial effects will arise.
3) Measures to be applied during Construction		
<i>Flood Risk and Water Resources</i>	Increase in runoff and erosion caused by soil compaction	Embed a CEMP and SMP with measures to mitigate compaction. Outline versions of these documents are submitted with the planning application with full detailed versions to be secured via a suitably worded planning condition.
	Risk of spillages of stored materials and hydrocarbons releasing contaminants to the water environment	- Limit the use and storage of chemicals and hydrocarbons - Appropriate storage and bunding of chemicals, including away from watercourses - Adherence to NRW Technical Guidance
	Risk of release of contaminants during HDD activities	- Minimise dewatering by cabling in dry months, if possible - Use non-consumptive and localised dewatering, if required
	Creation of enhanced ditches	- Excavate dry ditches in summer months or following prolonged dry spells - Excavate from the centre out, leaving a 'plug' in the ends preventing water ingress from adjacent wet ditches - Establish vegetation before removing the 'plugs' - Remove 'plugs' carefully to limit soil erosion potential - Spread excavated material across the Solar Site



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ES Chapter / Topic	Likely Significant Effects	Mitigation Measures
<i>Archaeology</i>	Displacement and removal of known and potential buried archaeological remains	Archaeological investigation and recording, delivering benefits which would offset the loss of remains.
<i>Ground Conditions and Land Contamination</i>	Human Health (on-Site) exposure to potential contamination through ground disturbance	- Appropriate training of construction and maintenance workers in the handling and use of potentially hazardous substances and the associated risks. - The Construction (Design and Management) Regulations 2015 (CDM) regulate the health, safety and welfare of construction projects and will apply to the Proposed Development. A Principal Designer and a Principal Contractor ('PC') will be appointed to plan, manage, monitor, and coordinate health and safety during the pre-construction and construction phases, respectively. The PC will have responsibility for ensuring legislative compliance and obtaining all permits/licenses as required. The CDM Regulations require a pre-construction information pack ('PCIP') to be provided by the Applicant (the 'Client' under CDM) or by the Principal Designer if the Client delegates this duty. The pack contains all information that is held or is readily available. The PCIP will be used by the PC to prepare construction and decommissioning phase risk assessments and method statements. The risk assessments will be informed by the findings of ground investigations undertaken at the Site. - Occupational health and safety measures e.g., Personal Protective Equipment (PPE), and statutory health and safety compliance (e.g., compliance with the Confined Spaces Regulations, 1997 in relation to ground gas from working in confined spaces/trenches) will minimise the risks associated with potential contamination. - The ES is supported by an oCEMP. The oCEMP will outline how the construction of the Proposed Development will avoid, minimise, or mitigate effects on the environment and surrounding area and will include measures such as: - An awareness briefing regarding ground conditions and appropriate methods of working to limit disturbance of potentially contaminated soil or water, where possible. The methods will be informed by the findings of the targeted ground investigation - Measures to minimise exposure to contaminated soils e.g., by controlling dust generation and the adoption of good hygiene standards will prevent prolonged skin contact, inhalation, and ingestion of soils during construction - Prevention measures including maintenance of construction vehicles, bunded storage, designated wheel washing areas, settling basins, screening stockpiles of materials, and dampening exposed soils as appropriate - A protocol for dealing with any unexpected contamination will be developed by the Contractor and will include: - Details of a watching brief and toolbox talks to be implemented throughout the construction phase; - Details regarding how any affected area will be delineated, protected, investigated and assessed; - The qualifications and competencies of the person appointed to oversee the works; - The preparation of a method statement for how the contamination will be dealt with or remediated (as appropriate); - An escalation policy describing when and how any notifications and approvals will be agreed with the Local Planning Authority (LPA); and - Details of verification procedures for any mitigation or remediation works.
	Human Health (off-Site) exposure to potential contamination through ground disturbance	
	Mobilisation of existing potential contamination	



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ES Chapter / Topic	Likely Significant Effects	Mitigation Measures
	through ground disturbance impacting upon surface water	- The control of earthworks or materials movement (including any re-use of materials) will only be undertaken in accordance with appropriate Environmental Permits, exemptions, or the CL:AIRE The definition of Waste: The development industry Code of Practice (CL:AIRE, 2011). - Any temporary dewatering activities during construction, if required, will be undertaken in accordance with NRW guidance (Environment Agency, 2023 ; NRW, 2025 ; NRW, 2025) (including appropriate assessment undertaken as required by the guidance (Environment Agency, 2007)), and if required, an Abstraction Licence and Environmental Permit (for the discharge) will be obtained. Such works will be limited to the depth and time required to facilitate construction activities. - The ES will be supported by an oCEMP. The oCEMP will outline how the construction of the Proposed Development will avoid, minimise, or mitigate effects on the environment and surrounding area and will include measures such as: - An awareness briefing regarding ground conditions and appropriate methods of working to limit disturbance of potentially contaminated soil or water, where possible. The methods will be informed by the findings of the targeted ground investigation. - Measures to minimise and control runoff/leaching to Controlled Waters. - Prevention measures including maintenance of construction vehicles, bunded storage, designated wheel washing areas, settling basins, screening stockpiles of materials, and dampening exposed soils as appropriate.
	Mobilisation of existing potential contamination through ground disturbance impacting upon groundwater	
	Damage to structures resulting from land instability hazards	Damage to structures resulting from land instability hazards
<i>Biodiversity</i>	Designated Sites, Habitats and species	Protection of designations, habitats and species interests through the delivery of measures set out in a CEMP and Ecological Construction Method Statement (ECMS) which will be secured via planning conditions and prepared in accordance with the submitted Outline CEMP and Outline ECMP
<i>Landscape and Visual</i>	Changes to landscape character and visual receptors	- Protection of retained trees as outline in the Arboricultural Impact Assessment, to be submitted alongside the planning application - Implementation of a CEMP, which will be secured via a planning condition and prepared in accordance with the submitted oCEMP, as well as ECMS
<i>Built Heritage</i>	Temporary changes to experience of Kinmel Park from construction activities within Cable Corridor	Implementation of CEMP measures, which will be secured via a planning condition and prepared in accordance with the submitted oCEMP: dust suppression, noise control and on-site traffic management, avoidance of activities in areas of parkland features and reinstatement of land within Cable Corridor
	Temporary changes to settings of Listed Buildings, Registered Historic Parks and Gardens and non-designated buildings from construction activities	Implementation of CEMP measures , which will be secured via a planning condition and prepared in accordance with the submitted oCEMP: dust suppression, noise control and on-site traffic management
<i>Climate Change</i>	Greenhouse gas emissions	Implementation of CEMP to reduce emissions from construction activities, through measures such as no unnecessary idling of engines, maintenance of plant equipment so they are operating optimal and efficient use of



ES Chapter / Topic	Likely Significant Effects	Mitigation Measures
		materials to reduce waste. These measures will reduce energy consumption and waste/pollutant generation during construction, thus leading to a lower carbon footprint. Implementation of a CTMP to improve efficiencies of vehicle movements during construction to reduce GHG emissions associated with construction traffic.
	Effects of climate change on construction workers	- Implementation of the CEMP and ECMS which details measures to reduce climate change impacts on habitats, species, flood risk and drainage. Health and safety of the construction works is also considered in the CEMP. - As the climate changes, work practices will be managed during construction to be better adapted to weather conditions, including the use of Personal Protection Equipment (PPE) more frequently.
4) Mitigation Measures to be applied post construction		
<i>Ground Conditions and Land Contamination</i>	Human Health (on-Site) exposure to potential contamination through ground disturbance	Decommissioning Phase - The ES will be supported by an outline Decommissioning Environmental Management Plan (oDEMP). The oDEMP will provide a framework for the future decommissioning of the Proposed Development and restoration of the land. It is anticipated that a framework will be provided to reflect the amount of time that will elapse between the construction of the Proposed Development and the time at which a document suite would be required for the management of environmental effects associated with its decommissioning. In respect of existing contamination in the ground, the construction of the Proposed Development will resolve certain known-unknowns, e.g., the potential for unexpected contamination which, if encountered during construction, will be managed and remediated appropriately such that hazards present during construction are unlikely to be present during decommissioning. A planning condition would secure a detailed DEMP to be prepared in accordance with the oDEMP for submission to the LPA(s) for approval prior to decommissioning.
	Human Health (off-Site) exposure to potential contamination through ground disturbance	
	Mobilisation of existing potential contamination through ground disturbance impacting upon surface water	
	Mobilisation of existing potential contamination through ground disturbance impacting upon groundwater	
<i>Biodiversity</i>	Designated Sites, Habitats and species	To deliver net benefits for biodiversity, mitigation measures in respect of new habitat creation/enhancement and prescriptions for their sensitive long-term management are set out in the submitted Outline Landscape Environmental Management Plan (oLEMP). A planning condition would secure a detailed LEMP to be prepared in accordance with the oLEMP and submitted to the LPA(s) for approval.
<i>Landscape and Visual</i>	Landscape character	For compliance with PPW, mitigation measures in respect of new habitat creation/enhancement and prescriptions for their sensitive long-term management are set out in the submitted Outline Landscape Environmental Management Plan (oLEMP). A planning condition would secure a detailed LEMP to be prepared in accordance with the oLEMP and submitted to the LPA(s) for approval.
<i>Built Heritage</i>	Changes to setting of Listed Buildings, Registered Historic Parks and Gardens and non-	Management of on-site maintenance traffic and vegetation planting



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ES Chapter / Topic	Likely Significant Effects	Mitigation Measures
	designated buildings during operation	The proposed development layouts and landscaping strategy have been carefully designed and informed by specialist heritage advice following assessments and site visits so as to ensure there are no adverse impacts on the settings of any nearby designated and non-designated heritage assets.



15 Impact Interactions

15.1 Introduction

- 15.1.0 Significant environmental effects can result from incremental changes caused by the interactions between effects resulting from a development.
- 15.1.1 The direct and indirect effects of the Proposed Development have been assessed within the relevant topic chapters of the ES prepared by suitable technical specialists. Environmental effects are assessed relative to the topic under consideration. This approach can lead to the interaction of effects being reported in separate chapters but the collective effect on the same environmental resource(s) not being considered.
- 15.1.2 In response, this chapter, prepared by Stantec, summarises the principal findings of each topic chapter of the ES to enable assessment of the potential for impact interactions. Some topics in this ES, such as Biodiversity (**Chapter 10**), inherently consider effects from other topics chapters on receptors that are assessed within their assessment. This has been considered in the below **Section 14.3** to **Section 14.5**.

15.2 Methodology

- 15.2.0 The assessment methodology involves the identification of impact interactions associated with the construction, operational and decommissioning phases of the Proposed Development upon one or more environmental resources. This is undertaken using a qualitative appraisal process. Receptors have been grouped together into Natural Resources and Human Beings and Society categories.
- 15.2.1 A summary of residual effects is provided in **Chapter 16** which has been used to help identify where there is a likelihood for potential significant adverse impact interactions to occur. This has been determined by considering the capacity of the receptors to accommodate the changes likely to occur as a result of the identified impacts.
- 15.2.2 The residual effects that have been identified as having the potential for an impact interaction on Natural Resources relate to:
- Hedgerow and tree habitats.
- 15.2.3 The residual effects that have been identified as having a potential for an impact interaction on Human Being and Society relate to:
- Local communities / residential receptors.

15.3 Construction Effects

- 15.3.0 As set out in **Chapter 5**, careful management of construction works, including the implementation of a Construction Environmental Management Plan (CEMP), which will be secured through a suitably worded planning condition with an outline CEMP provided as part of the ES (**Appendix A.5**), will minimise the adverse effects of construction. As a result, the majority of the construction effects identified in **Chapters 6 – 13** are not adversely significant. The following section discuss, in more detail, impact interactions and effects associated with the construction phase.

Natural Resources

- 15.3.1 As presented in **Chapter 10- Biodiversity**, there will be a **Negligible** and **Not Significant** effect on hedgerow loss. In addition to this effect **Chapter 11 - Landscape and Visual** has



assessed a **Moderate to Major Adverse** effect on onsite landscape features including hedgerows. The impact interaction identified on hedgerows during construction will be no greater than the effect previously concluded in each ES chapter.

Human Beings and Society

- 15.3.2 No impact interactions during the operation of the Proposed Development have been identified on human beings and society.

15.4 Operation Effects

Natural Resources

- 15.4.0 As presented in **Chapter 10 - Biodiversity**, habitat creation and enhanced habitat connectivity is anticipated to deliver long-term **Minor Beneficial** effects at up to a Local level on habitat such as hedgerows, trees, grassland and pond. **Chapter 11 - Landscape and Visual** has assessed a **Moderate to Major Adverse** effect on onsite landscape features including hedgerows during Year 1 and Year 15 of the Proposed Development. In addition to these effects **Chapter 9- Climate Change** states that the risk of BESS fire has the potential to result in temporary ecological impacts such as habitat loss. However, with mitigation measures in place the risk of Major Accidents and Disaster (MA&D) from a BESS fire is **Not Significant**. Therefore, the impact interaction identified on hedgerows during construction will be no greater than the effect previously concluded in each ES chapter.

Human Beings and Society

- 15.4.1 Effects on surrounding residential receptors have been assessed in **Chapter 11 - Landscape and Visual** and **Chapter 13 – Other Considerations (Major Accidents & Disaster)**. The effect on residential receptors has been addressed in **Chapter 11- Landscape and Visual** and a **Minor Adverse** effect is assessed during Year 1 and Year 15 of the Proposed Development. The release of hazardous substances into the atmosphere from a BESS fire has the potential for environmental contamination in the form of gaseous and liquid release, including substances like hydrogen fluoride and carbon monoxide. The migration of these gases can pose a risk to local communities. However, with mitigation measures in place the risk of MA&D for BESS fires is **Not Significant**. The risk of Major Accidents and Disaster as a result of Unexploded Ordnance (UXO) to the health of nearby residents is considered to be **Not Significant** with mitigation measures in place. It is considered that with the implementation of the mitigation measures, no additional impact interaction to surrounding residential receptors over and above the effect previously stated in the ES chapter.

15.5 Decommissioning Effects

Natural Resources

- 15.5.0 No impact interactions during the decommissioning of the Proposed Development have been identified on natural resources.

Human Beings and Society

- 15.5.1 No impact interactions during the decommissioning of the Proposed Development have been identified on human beings and society.



16 Statement of Significance

16.1 Residual Effects

- 16.1.0 The residual effects of the Proposed Development following implementation of the proposed mitigation measures outlined in the preceding technical chapters and in **Chapter 3- Site and Site Description** have been assessed. Each technical chapter contains detailed consideration of residual effects; however, **Table 16.1** summarises the main residual effects of the Proposed Development. The significance criteria are set out in **Chapter 2- Assessment Method**, and within relevant technical chapters where a different approach is followed.
- 16.1.1 The preparation of the ES was undertaken in parallel with the design development process which in turn was informed by the technical specialists following technical assessments and surveys in addition to feedback received during consultation. Consequently, many measures to mitigate likely significant adverse environmental effects have been embedded into the Proposed Development design in order to avoid, reduce or offset such effects. With respect to management of the construction process, it is intended that best practice techniques and procedures will be adopted through implementation of a CEMP. These will address relevant environmental issues, such as noise; air quality and dust; hours of work; site drainage and protection from or minimisation of surface/ground-water pollution and protection of environmental and amenity resources. It is anticipated that the mitigation measures identified will be secured by planning conditions, to ensure that the high-quality scheme proposed by the Applicant is delivered.
- 16.1.2 A summary of the significant residual effects of the Proposed Development are presented in **Table 16.1**.



Environmental Statement

Table 16.1: Significance Table

Topic	Stage of Development	Residual Effects	Duration of Effect	Geographical Importance							Significance of Residual Effect
				I	K	E	R	C	B	L	
Climate Change	Construction	GHG Emissions	Temporary	X							Moderate Adverse
	Operation	GHG Emissions	Permanent	X							Beneficial
Biodiversity	Operation	Creation and Enhancement of Habitats	Permanent							X	Local Level Positive
Landscape and Visual	Operation	Landscape Character – Solar Site	Permanent							X	Moderate/Minor Neutral
	Operation	Landscape Character – BESS Site	Permanent							X	Moderate Neutral
	Operation	PVP 4 and 13	Permanent							X	Moderate Adverse
	Operation	R6	Permanent							X	Moderate/Major Adverse



