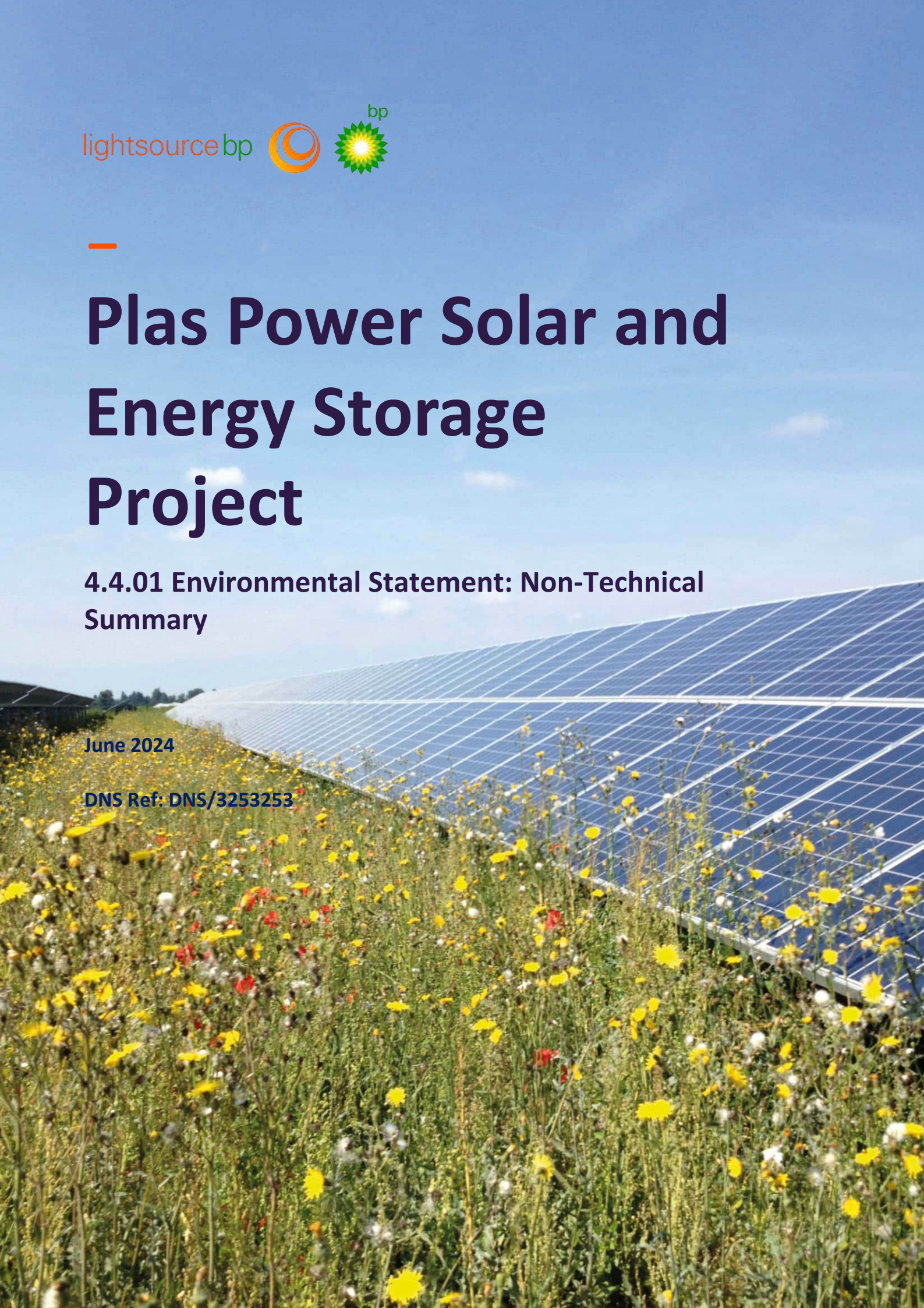


Plas Power Solar and Energy Storage Project

4.4.01 Environmental Statement: Non-Technical Summary

June 2024

DNS Ref: DNS/3253253

PLAS POWER SOLAR AND ENERGY STORAGE PROJECT

Environmental Statement: Non-Technical Summary

JPW1473
May 2024

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
Draft	For consultation	EA	AL	AL	Nov 2023
Final	For submission	EA	AL	AL	May 2024

Approval for issue

Andrew Lucas [redacted] May 2024

The report has been prepared for the exclusive use and benefit of our client and solely for the purpose for which it is provided. Unless otherwise agreed in writing by R P S Group Limited, any of its subsidiaries, or a related entity (collectively 'RPS') no part of this report should be reproduced, distributed or communicated to any third party. RPS does not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. The report does not account for any changes relating to the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report.

The report has been prepared using the information provided to RPS by its client, or others on behalf of its client. To the fullest extent permitted by law, RPS shall not be liable for any loss or damage suffered by the client arising from fraud, misrepresentation, withholding of information material relevant to the report or required by RPS, or other default relating to such information, whether on the client's part or that of the other information sources, unless such fraud, misrepresentation, withholding or such other default is evident to RPS without further enquiry. It is expressly stated that no independent verification of any documents or information supplied by the client or others on behalf of the client has been made. The report shall be used for general information only.

Prepared by:

RPS

Prepared for:

Lightsource bp

Contents

1 INTRODUCTION 1-1
2 PROPOSED DEVELOPMENT DESCRIPTION 2-1
3 NEED AND ALTERNATIVES CONSIDERED 3-1
4 EIA METHODOLOGY 4-7
5 LANDSCAPE AND VISUAL 5-1
6 BIODIVERSITY 6-1
7 CULTURAL HERITAGE 7-5
8 HYDROLOGY AND HYDROGEOLOGY 8-1
9 CLIMATE CHANGE 9-1
10 SOILS 10-4

Tables

Table 2.1 – Key Parameters for Environmental Assessment
Table 2.2 – BESS Components
Table 2.3 – Indicative Phasing of Construction
Table 2.4 – Construction Plant and Equipment
Table 2.5 – Schedule of Measures to be Adopted as part of the Proposed Development During Construction
Table 4.1 – Typical Assessment Matrix

Figures

Figure 1.1 – Site Location Plan
Figure 2.1a – Indicative Site Layout Plan Solar and Battery
Figure 2.1b – Alternative Indicative Site Layout Plan (Solar)
Figure 2.2 – Indicative BESS Layout
Figure 2.3 – Illustrative Landscape and Ecology Masterplan

1 INTRODUCTION

Introduction

1.1 This Environmental Statement (ES) Non-Technical Summary (NTS) has been prepared by RPS on behalf of Lightsource SPV 192 Limited ('the Applicant').

1.2 The NTS accompanies a planning application for the Plas Power Solar and Energy Storage Project (herein referred to as the 'Proposed Development'). The Proposed Development includes the construction and operation of a solar photovoltaic electricity generating station ('solar farm'), a Battery Energy Storage System ('BESS') and associated ancillary development. The solar element of the Proposed Development is anticipated to have an export capacity of 57MWac and the BESS will have an installed capacity of 57MWac. At the end of the Proposed Developments 40-year life it will be decommissioned, dismantled and removed with the site being restored.

1.3 The Proposed Development site (the 'site') is located on the Plas Power Estate, Ruthin Road, Wrexham LL11 3BS, approximately 2.5 km to the west of Wrexham city centre. It is wholly within the administrative boundary of Wrexham County Borough Council ('WCBC'). The site location is shown on **Figure 1.1** Site Location Plan.

1.4 Taking into account the nature and scale of the Proposed Development, a process of Environmental Impact Assessment (EIA) has been undertaken in accordance with UK legal requirements to assess the likely significant environmental effects arising from the Proposed Development.

1.5 An Environmental Statement has been produced, setting out the findings of the EIA process. This document is the NTS, submitted as part of the planning application.

1.6 This summary document provides an overview of the assessment findings. Details of how to view the full ES and how to obtain further copies of this NTS are provided at the end of this document.

1.7 The ES and NTS is submitted to Planning and Environment Decisions Wales (PEDW). The submitted planning application, including the ES and NTS can be viewed at:

Wrexham County Borough Council
Guildhall
Wrexham
LL11 1AY

1.8 Copies of the ES and planning application documents will also be able to be viewed on the PEDW DNS website:

https://gov.wales/developments-national-significance-dns-applications

1.9 Further copies of the ES can be obtained from the following address at a cost of £250 plus VAT or an electronic copy for a cost of £10:

RPS
2 Callaghan Square
Cardiff
CF10 5AZ

1.10 All comments on the ES (and planning application) should be issued to PEDW. Further detail on how to comment can be found via the Planning Casework service at:

https://planningcasework.service.gov.wales/

2 PROPOSED DEVELOPMENT DESCRIPTION

The Site and Surrounding Area

2.1 The application site (the "site") covers approximately 136 hectares (ha) and is located wholly within the administrative boundary of Wrexham County Borough Council ('WCBC'). The site is approximately 2.5 km to the west of Wrexham town city centre (see **Figure 1.1** – Site Location Plan).

2.2 The site comprises two interconnected areas north and south of the A525 Ruthin Road. The southern and larger part of the site is bound by the A525 Ruthin Road to the north, to the east by the A483, to the south by Plas Power Woods and its westernmost point by agricultural fields beyond which lies Rhos Berse Road and Nant Road. The northern parcel is bound by the A525 Ruthin Road to the south and extends northwards towards Higher Berse Road. Coedpoeth lies approximately 120m to the west and New Broughton lies approximately 600m north-west of the site. The site comprises several agricultural fields, primarily used for pasture grazing, bound by a mixture of mature woodland, trees, hedgerows, fencing, agricultural tracks and roads.

2.3 The site formed part of an open cast mine in 1964 and was subsequently filled in 1976. The site is currently used for agricultural purposes, comprising of agricultural fields, primarily used for pasture grazing, bound by a mixture of mature woodland, trees, hedgerows and fencing. Parts of the northern parcel comprise arable land for the purpose of growing potato crops.

Description of the Proposed Development

2.4 The Proposed Development is for a solar project with a battery energy storage system (BESS). The Proposed Development will consist of the construction of solar panels mounted on metal frames, new access tracks, underground cabling, perimeter fencing with CCTV cameras, switchgear substations, inverters, transformer stations, auxiliary transformers, permanent storage containers, monitoring houses, a BESS and all ancillary grid infrastructure and associated works. It will also include landscaping and ecological enhancement areas. The solar element of the Proposed Development is anticipated to have an export capacity of 57MWac and the BESS will have an installed capacity of 57MWac. At the end of the Proposed Developments 40-year life it will be decommissioned, dismantled and removed with the site being restored.

2.5 The Proposed Development will include a 33kV cable that will connect the solar, BESS and associated infrastructure to the Legacy Substation located approximately 1.2km to the south-west of the site, north of the B5246 Bronwylfa Road. Two cable route options are currently under consideration and have been assessed in this EIA.

Summary of Key Parameters

2.6 The table below provides a summary of the key parameters which have formed the basis for the assessment of effects.

Table 2.1: Key Parameters for Environmental Assessment

Element of the Development	Key Parameter for EIA (approximate)
Site area	Approximately 136 hectares.
Maximum height	Solar panels, inverters and transformers up to 3.2 m above ground.
	Substations up to 3.5 m above ground.
	Monitoring House up to 3.3 m above ground.

	Storage container up to 2.6 m above ground. Battery Storage Units up to 2.6 m above ground.
Area of built development comprising:	
Area covered by solar panels	Approximately 136ha hectares. The panels will be positioned at an angle of between 15-25 degrees, with a proposed height of up to 3.055m to the top of the panel frame on level ground, including 1m of ground clearance to enable maintenance access below the PV modules. Where there the ground undulates there may be minor variability to the maximum height up to 3.20m.
Inverters in containerised units	Containerised units are anticipated to be 2.3 m wide, 8.2 m long and 2.8 m high. It is anticipated that there will be 26 inverters and each is anticipated to be 8.2m (L) x 2.3m (W) x 2.8m (H) (including the base).
Transformers	It is anticipated that there will be 26 transformers. It is anticipated that each will be 5.5m (L) x 4.5m (W) x 3.2m (H).
Switchgear substations	It is anticipated that there will be 14 switchgear substations. It is anticipated that each will be 4.2m (L) x 2.6m (W) x 3.15m (H) (including the base).
Auxiliary transformer	It is anticipated that there will be 1no. auxiliary transformer. This is anticipated to be 3.8m (L) x 3.8m (W) x 3.2m (H).
PV Intake Substation	It is anticipated that there will be 1no. PV intake substation. This is anticipated to be up to approximately 10.5m (L) x 2.5m (W) 3.1m (H) (including the base).
Customer Substation	It is anticipated that there will be 1no. customer substation. This is anticipated to be approximately 10.3m (L) x 5.0m (W) 3.9m (H) (including the base).
GRP Substation	It is anticipated that there will be 1no. GRP Substation. This is anticipated to be approximately 3.0m (L) x 3.0m (W) x 2.55m (H).
Monitoring House/Communications Building	It is anticipated that there will be 2no. monitoring houses / communications buildings. Both are anticipated to be the same design and size, which will be 3.9m (L) x 3.2m (W) x 3.3m (H) (including the base).
Spares container	It is anticipated that there will be 1no. storage container. This is anticipated to be 12.4m (L) x 2.6m (W) x 2.9m (H).
Security fencing and gates	Fencing of approx. 2m height surrounding the site. Gates approx. 2.0m (H) and 5.0m (W).
Solar CCTV	Numerous CCTV cameras mounted on poles 2.5-3.5m high.
Composting Toilet	It is anticipated that this will be 2.4m (L) x 2.5 (W) x 3.0 (H).
Up to 28 Emergency Lighting Posts	3.86m (H)
Internal access roads	Internal road network to allow access on site approx. 3.5m – 4.5m wide.
BESS Enclosures	It is anticipated that there will be 14 groups of 4no. BESS enclosures. Each group of 4 enclosures is anticipated to be 16.62m (L) x 3.88m (W) x 3.0m (H).
BESS - BIC	It is anticipated that there will be 14 no. Battery Interface Cabinets (BICs). The BICs facilitates the battery enclosures to electrically interface with the electrical network on site. Each BIC is anticipated to be 2.2m (L) x 1.1m (w) x 2.3m (H).
BESS - Twin MV Skid	It is anticipated there will be 7 no. Twin MV Skids. Each Twin MV Skid is anticipated to be 13.37 (L) x 6.9m (W) x 3.96 (H).
BESS Backup Generator	It is anticipated there will be 1no. BESS Backup Generator. This is anticipated to be 6.3m (L) x 2.64m (W) x 2.89m (H).
BESS Spares Container 20ft	It is anticipated there will be 1no. BESS Spares Container. This is anticipated to be 6.3m (L) x 2.64m (W) x 2.9m (H).

BESS Intake Substation	It is anticipated there will be 1no. BESS Intake Substation. This is anticipated to be 15.70m (L) x 3.00m (W) x 3.60m (H).
BESS Security Fencing	The BESS security fencing is typically welded mesh up to approximately 2.5m high.
BESS CCTV	It is anticipated there will be up to 7 CCTV posts surrounding the BESS. The BESS CCTV will be circa 3.5m high on galvanised steel posts.
BESS Gate	The BESS security fencing is typically welded mesh up to approximately 2.5m high.
BESS Lighting Pole	There will be 28 individual lighting columns each with a height of 3.86m.
Areas of landscaping/semi-natural greenspace	Native hedgerow and tree planting provided to improve screening of the Proposed Development were practicable. 2no. landscape and ecology mitigation areas of approx. 3 ha.
Cabling	Preferred cable route option and 3 additional proposed cable route options routing south of the site and connecting to existing National Grid Substation. The max depth of cable trenching is anticipated to be 1m deep and up to approximately 1m wide and backfilled (or HDD as necessary).
Access	4no. access points – Access 1 (to be constructed at the northern boundary of the southern parcel off the A525), Access 2 (access to the northern parcel via an existing farm access routing north off the A525), Access 3 (existing Home Farm access) and Access 4 (access to the southern parcel from the south along Rhos Berse Road).
Drainage	Temporary construction drainage systems and conceptual surface water drainage strategy comprising permeable surfacing and swales.

Key Components

Solar Arrays

2.7 Solar panels, also known as photovoltaic panels (PV), are made up of cells, which convert the light energy from daylight into electrical energy.

2.8 The solar panels will be attached to metal frames or mounting structures which together form PV tables (or modules). The PV tables will be fixed to pile driven galvanised steel posts. The frames are typically made of galvanised steel or zinc, magnesium or aluminium alloy coating and will have a rough matt finish, rather than a polished finish. The base of the frame piles are thin ‘H’ or ‘C’ shapes, thus they have very little impact on the ground and do not require any prior excavation. The frames are driven to a depth of a minimum of 1.5-2m depending on ground conditions.

2.9 The frames will allow the panels to be positioned at an angle of between 15-25 degrees from the horizontal axis and orientated to the south, typically the height of a panel will be up to approximately 3.055m to the top of the panel frame on level ground, including up to approximately 1m of ground clearance to enable maintenance access and continued sheep grazing below the PV modules. Subject to topography, the maximum height of the panel could be up to approximately 3.20m high.

2.10 A solar panel array will comprise of multiple rows of solar panels running east to west. Between each row of solar panels there would be a gap of approximately 2-2.5m to avoid overshadowing from one solar row to another.

2.11 The solar panels will be set back from the site boundaries to allow for landscaping and screen planting, perimeter security fencing, CCTV coverage, access tracks and maintenance access.

Image 1: Example of solar arrays installed at existing operational solar site



Image 2: Example of sheep grazing below PV modules at existing operational solar site



Inverters, Transformers and Switchgear Substations

2.12 The Applicant is currently considering two inverter options:

- String inverters; or
- Central inverters.

2.13 The inverters are required to convert the Direct Current (DC) electricity generated by the panels, to Alternating Current (AC) which is compatible with the wider UK grid network. From the inverters, the electricity flows to a transformer which 'steps-up' the voltage of the electricity from low voltage (LV) to medium voltage (MV) before it reaches the switchgear substations. The switchgear substations include a 'switch' mechanism to shut parts or all of the solar farm off from the wider network in the event of a fault (similar to a household fuse box).

2.14 String inverters would be mounted onto support frames whilst central inverters would be situated in pairs at regular intervals throughout the site. Central inverters are larger and comprise containerised units, as shown in grey on the site layout (refer to **Figure 2.1a** – Indicative Site Layout Plan Solar and Battery) and will measure up to approximately 8.2m long (L), 2.3m wide (W) and 2.8m high (H) (including the base). For the purpose of the EIA, central inverters are assumed to be included representing a worst-case both in terms of scale and noise source.

2.15 The proposed transformers will be up to approximately 5.5m (L), 4.5m (W) and 3.2m (H), these are an 'open air' design, surrounded by a fence and accompanied by a switchgear substation. The switchgear substations will be up to 4.2m (L), 2.6m (W) and 3.15m (H) (including the base). The inverters, transformers and switchgear substations will be sited on a hardcore base.

2.16 The electricity generated across the site, will be cabled to the main customer substation to the south of the site. All cabling will be routed underground.

Auxiliary Transformer

2.17 There will be one auxiliary transformer located within the site adjacent to the customer substation in the south-west of the site (as described further in paragraph 2.35 below). This will be up to approximately 3.8m (L) x 3.8m (W) 3.2m (H). The auxiliary transformer will provide low voltage electricity supply to ensure the safe and secure operation of the site.

Substations

2.18 All electricity from across the solar PV arrays will collect at a substation (referred to as the 'PV Intake Substation') which will be installed to the south-west of the site.

2.19 A further BESS Intake Substation will be located in the BESS compound as described below. Both the PV Intake and BESS Substations connect into the Customer Substation which will be owned, operated and maintained by the operator. From here, a high voltage (HV) cable buried underground, will connect the solar farm to the existing grid network.

2.20 The PV Intake Substation will be up to approximately 10.5m (L) x 2.5m (W) 3.1m (H) (including the base). The customer substation will be up to approximately 10.3m (L) x 5.0m (W) 3.9m (H) (including the base).

GRP Substation

2.1.1 The GRP cabinet supplies low-voltage power to the Battery Storage systems, facilitating ventilation and refrigeration for the battery units. Its GRP structure offers a more compact footprint compared to the brick building option and will be 3.00m (L) x 3.00m (W) x 2.55m (H).

Monitoring House

2.21 A monitoring house is required to enable remote monitoring of the solar PV site. This building is typically up to approximately 3.9m (L) x 3.2m (W) and 3.3m (H) (including the base). This building will provide daily information/data in relation to the operation of the solar farm. During a solar farm's operation, data communication is vital to facilitate information flow from equipment such as inverters to a central control centre and alert the Applicant to any potential operational issues with the solar farm and or battery storage compound. In addition to this an up to approximately 5.05m (above ground level) weather station attached to the outside of the building is proposed to monitor wind speed, direction, and temperature.

2.22 A further Monitoring House will be located in the BESS compound as detailed below.

Spares Container

2.23 It is proposed that one permanent spares container will be located within the site to store miscellaneous spare parts. This unit will measure approximately 12.4m (L) x 2.6m (W) x 2.9m (H). A further Spares Container will be located in the BESS compound as detailed below.

Battery Energy Storage System (BESS)

2.24 The BESS allows for surplus energy generated at times of high production to be stored and dispatched to the grid at times when the energy is needed. The BESS therefore contributes to balancing the intermittent energy production and maximises the site's efficiency to allow a greater output of clean energy.

2.25 The BESS will be located to the south of the site, close to the infrastructure associated with the solar farm, and away from residential properties and sensitive viewpoints.

2.26 The BESS will comprise batteries, combined Power Conversion Systems (PCS), a BESS Intake substation, and associated infrastructure.

2.27 The overall BESS layout is shown on **Figure 2.2** – Indicative BESS Layout and will comprise the following components as set out in **Table 2.2** below.

Table 2.2: BESS Components

BESS Component	Maximum Approximate Dimensions
14 x 4 BESS Enclosures	16.62m (L) x 3.88m (W) x 3.0m (H)
14 x BIC (Battery Interface Cabinet)	2.2m (L) x 1.1m (w) x 2.3m (H)
7 x Twin MV Skid	13.37 (L) x 6.9m (W) x 3.96m (H)
1 x BESS Backup Generator	6.3m (L) x 2.64m (W) x 2.89m (H)
1 x BESS Spares Container	6.3m (L) x 2.64m (W) x 2.9m (H)
1x BESS Intake Substation	15.70m (L) x 3.00m (W) x 3.60m (H)
1x BESS Monitoring House	3.86m (L) x 3.2m (W) x 3.3m (H)

2.28 There will be security fencing around the BESS compound which will function to restrict unauthorised access into the compound and to deter theft or vandalism. Fencing is typically welded mesh up to approximately 2.5m high with metal posts, combined with CCTV. The BESS CCTV cameras will be as per the CCTV for the rest of the site with the exception that they will be circa 3.5m high on galvanised steel posts rather than ranging from 2.5m – 3.0m in height. There will be up to 7 CCTV posts surrounding the BESS.

2.29 A gate will be located at the access point to the BESS and will be integrated into the security fencing. The gate will be up to approximately 2.5m high. The BESS will include lighting columns adjacent to each BESS enclosure. There will be 28 individual lighting columns each with a height of 3.86m.

CCTV and Infra-red Lighting

2.30 CCTV cameras will be carefully positioned around the periphery of the site. These cameras will be up to circa 2.5-3.0m high on galvanised steel posts. They will use passive infra-red technology, thereby avoiding the need for lighting. These will enable remote surveillance of the site.

Facilities

2.31 A composting toilet will be based on-site for use by staff during operational and maintenance works. It can also be made available for use by visitors as necessary. It is anticipated that this will be 2.4m (L) x 2.5 (W) x 3.0 (H).

Security Fencing and Gates

2.32 The Proposed Development will be secured by perimeter fencing. This will be deer fencing with wooden posts at circa 3.5m centres. The fence will be approximately 2m high with small mammal gates fitted at appropriate points to enable free access into and out of the site.

2.33 The security fencing will function to restrict unauthorised access into the site and to deter theft or vandalism. Deer fencing has been selected due to its relative visual permeability and minimal impact on natural surface water flows. A minimum distance of 3m will be maintained between the security fencing and the solar arrays.

Image 3: Example of perimeter fencing at existing operational solar site



Cabling

2.34 All of the cabling within the northern and southern parcels of the site will be laid underground via surface dug trenches of up to approximately 1m deep and 50cm wide and backfilled. These will

utilise existing access tracks and road options wherever practicable, particularly where sensitive habitats or archaeology are potentially present.

2.35 A cable route between the northern and southern parcels will be installed using Horizontal Directional Drilling (HDD) under the road and trees into the site and via an existing Public Right of Way (PRoW) to reduce disruption to the road and any impact on the woodland as far as practicable.

2.36 The 33kV cable route from the substations to the south of the site, will connect to the existing Legacy Substation to the south-west of the site, passing to the east of Bersham Ironworks Museum, under the River Clywedog and Clywedog Trail via HDD.

2.37 As presented within **Figure 2.1a** the 'preferred cable route option' is shown as well as three short alternative cable route options. All options will route south of the site before joining the Plas Buckley Road. All options would follow the existing unnamed road west to the north of Cadwgyn Hall, before connecting to Legacy Substation. Cable Route Option 1 would pass to the south of Cadwgyn Hall through agricultural fields, before connecting to Legacy Substation. Cable Route Option 1 would cross Footpath ESC/1. Should this cable route be pursued, the PRoW may need to be temporarily closed for the duration of the works.

2.38 The Preferred cable route would however route along the road past Cadwgyn Hall, the excavation of the trench to install the cable would be limited to the extent of the road to avoid impacting on Offa's Dyke. In addition, precautionary working methods will be applied and detailed in the construction environmental management plan (CEMP) to prevent adverse impacts to the River Clywedog which runs just north of the unnamed road in this location. Alternatively at this location, Cable Route Option 1 would be installed by HDD under Offa's Dyke to reduce impact as far as practicable. Cable Route Option 2 and Cable Route Option 3 provide a short alternative route to connect from Plas Buckley Road to the south of the site.

2.39 All cable route options will likely require the temporary diversion or temporary closure of Footpath 'ESCLUSHAM/ABOVE/3' adjacent to the west of the legacy substation during the construction and laying down of the cable route, this would be for a temporary period and then re-instated following the cable route construction.

2.40 In terms of the assessment of the cable route options in this ES, each option has been assessed individually so that upon confirmation of the final cable route, an assessment of any effect associated with that route has been considered.

2.41 Where practicable the cable routes will be installed within the fields adjacent to the roads to reduce disruption to the road as far as practicable. These will be laid underground via surface dug trenches of up to approximately 1m deep and up to approximately 1m wide and backfilled.

2.42 There may be the need to remove some of the trees to the south of the site, adjacent to the A483, where the cable routes out of the site and if HDD is not practical.

Access and Parking

2.43 Several access points will be used for access during the construction, operation and maintenance and decommissioning phases of the Proposed Development. If necessary, some minor modifications will be required for temporary accesses to be created from the highway to enable access to the site for construction. Existing farm tracks will be used for internal access within the site wherever practicable. New access tracks, where required, will be formed, normally using a layer of permeable crushed stone.

2.44 The following access points are indicated on **Figures 2.1a:**

- Access 1 – east along the A525 which will serve as the main construction access point for the southern parcel of the site and will subsequently also be used as the main access for operation and maintenance site visits.
- Access 2 – existing farm access routing north off the A525 to access the northern parcel to be used for construction and operation of the Proposed Development.
- Access 3 – existing Home Farm access to be used as a maintenance access when the Proposed Development is operational.
- Access 4 – access to the southern part of the site from the south along Rhos Berse Road only to be used in exceptional circumstances and will be limited to staff or emergency vehicular access only.

Surface Water Drainage

2.45 A Flood Consequences Assessment and Conceptual Drainage Strategy has been produced and is included at **Appendix 8.1** (ES Volume 3).

2.46 The Proposed Development is expected to increase impermeable areas within the site by 0.03% of the total site area. A Sustainable Urban Drainage Strategy (SuDS) has been produced to incorporate appropriate management techniques that will mitigate potential increase in runoff from the Proposed Development. SuDS techniques including filter strips, swales and attenuation for ancillary features are proposed via gravel bases in which infrastructure will be located upon. Access tracks will be constructed out of permeable materials.

2.47 Solar PV arrays are designed in such a way to prevent surface water sheeting off panels and potentially causing erosion. Panels are designed to allow surface water to drip off, landing onto filter strips below.

2.48 All associated infrastructure will be placed on a gravel or concrete subbase sized to accommodate the 100 year + 20% climate change critical storm event. The detailed design stage will confirm exact construction methodology.

2.49 The detailed operational drainage design will be developed pre-construction with the objective of achieving drainage of the land to the present level.

Public Rights of Way

2.50 PRoW BER/1 (Bersham Public Footpath 1) runs through the southern parcel of the site and PRoW/8 (Bersham Public Footpath 8) also runs through the northern parcel of the site. This PRoW network runs north/north-west through the southern area of the site before meeting the A525. There will be no extinguishment of this PRoW as a result of the Proposed Development, however some minor re-alignment will be required to formally route both PRoWs along the route that they are walked on the ground (which differs from the alignment indicated on the WCBC Definitive PRoW Map. The proposed re-alignment will result in a more accessible route which isn't on a steep incline or intercepted by hedgerows. Where appropriate, hedgerow enhancements will be incorporated along the PRoW to screen views of the Proposed Development and a width of 5m will be incorporated for all PRoWs to be retained throughout the site.

Appearance and Design

2.51 The Proposed Development is low-lying in nature, and the infrastructure is typically shorter in height than the many existing mature trees and hedgerows around the site. The appearance will be a more modern and obvious human influence on the landscape compared to that currently formed by

agriculture. While construction will cover a wide area, the works would be temporary and the Proposed Development itself will be considerably less solid and durable in appearance than traditional buildings. This would mitigate against the likely change in the character of the landscape.

Landscape Strategy

2.52 Landscape mitigation is embedded in the overall design and has been formulated to reduce potential landscape and visual impacts as far as practicable and maximise enhancement of landscape features, landscape character and biodiversity of the site.

2.53 An Illustrative Landscape and Ecology Masterplan has been produced and is included at **Figure 2.3**. The landscape proposals include, but are not limited to, the following measures:

- internal and boundary hedgerow reinforcement appropriate to the arable and pastural fields that would improve the site's existing field structure, enhancing biodiversity and habitats for local wildlife and provide additional screening of the site and solar PVs within views.
- woodland edge scrub planting is proposed adjacent to existing areas of established woodland to improve connectivity and integration within the site.
- various meadow grassland mixes are proposed for habitat creation that include a tussocky grassland for grazing beneath the solar PVs, woodland meadow for the connectivity of areas adjacent to existing woodland, wetland meadow of wet areas and a wildflower meadow.

Image 4: Example of wildflower meadow at existing operational solar site



Image 5: Example of tree planting scheme at existing operational solar site



Lighting

2.54 There will be no use of artificial lighting during operation that could adversely affect field boundary habitats and/or adjoining woodland. Some temporary task lighting may be required during construction depending on the time of year and sunlight levels.

2.55 The BESS compound includes lighting columns adjacent to each BESS enclosure. The lighting in the BESS compound will only be used in the event of an emergency and will not be used as part of the regular operation of the Site.

Option to replace BESS with solar panels

2.56 The Battery Energy Storage System (BESS) is part of the Proposed Development and has therefore been assessed as such within the technical environmental assessments contained within this ES. If the construction of the BESS were not to take place, the land where the BESS is currently proposed would be used to place solar panels instead. **Figure 2.1b** illustrates the alternative layout should the BESS not be constructed, highlighting where the solar panels would be situated.

2.57 The technical environmental assessments contained within ES chapters 5-10 have assessed the Proposed Development in the context of the BESS being included as part of the design. In the scenario that the BESS is not built out and this land is used for additional solar panels instead, the environmental effects would be equal to or less than those currently presented within the technical chapters that are associated with the BESS in this location. As a result, the assessments present a worst-case scenario and allow the flexibility for either option to be brought forward in the future.

Sustainability

2.58 This section outlines the effects of the Proposed Development on sustainability factors such as energy demand, waste, use of natural resources and residues and emissions.

Energy Demand

2.59 The Proposed Development will supply electrical energy to the distribution network rather than generate demand. The Proposed Development will not only contribute to Welsh Government Net Zero targets but will also contribute to cost-effective energy generation and energy security with limited governmental subsidy and will, therefore, provide socio-economic and community benefits.

Waste

2.60 Waste produced during construction will be kept to a minimum and will be managed and sorted accordingly. Only registered waste management companies will be utilised to dispose of construction waste (packaging, wood, metal) or waste from the construction team (general domestic or canteen/kitchen waste). The specialist engineering, procurement and construction (EPC) contractor hired to construct the Proposed Development will ensure that all waste is disposed of responsibly. This will be subject to appropriate due diligence checks prior to contracting.

2.61 Following decommissioning there will be significant potential for recycling many of the materials used in the Proposed Development as set out under the 'Decommissioning' section below.

Use of Natural Resources

2.62 The Proposed Development is temporary in nature and fully reversable. Appropriate construction techniques will be implemented to reduce above and below ground works and to reduce any compaction of soil as far as practicable, mitigating any potential impact on the soil structure and ability to infiltrate water.

2.63 Most of the soil will not be physically impacted by the Proposed Development. Localised areas of earthworks will be required to create level platforms for the BESS, substations, transformers and other containerised infrastructure, and to create the trenches for the cables. Topsoil will be removed from the relevant areas and set aside separately from any subsoil. When backfilling the cable trenches, the subsoil will be replaced first, followed by the topsoil. Soils will be managed in accordance with the Outline Soils Resource Management Plan. Following decommissioning, the approach taken to construction allows the future quality of the agricultural land to be maintained with no likely lasting adverse effects on the quality of the soil.

2.64 A desktop Agricultural Land Classification (ALC) Survey of the site was completed by AMET in November 2022. The ALC survey confirms that only 6.4% of the survey area contains Grade 3a Best and Most Versatile (BMV) agricultural land. This area of Grade 3a agricultural land has however since been removed from the Proposed Development site. No areas of BMV land will be developed on as part of the Proposed Development. Chapter 10: Soil provides an assessment of the effect of the Proposed Development on soil. An outline Soils Resource Management Plan has also been produced and is included at **Appendix 10.1** of this ES.

Residues and Emissions

2.65 Details of any likely significant effects in relation to residues and emissions having regard to water are set out in Chapter 8: Hydrology and Hydrogeology of ES Volume 1.

2.66 Chapter 9: Climate Change of ES Volume 1 provides an assessment of the likely significant effects of the Proposed Development having regard to climate change, which concludes that the Proposed Development is likely to have a significant beneficial effect. This will be achieved through the Proposed Development's operation displacing carbon intensive forms of electricity generation outweighing the effect of emissions associated with the Proposed Development's construction. This

results in the Proposed Development contributing positively to WG targets for the reduction of greenhouse gas emissions. A summary of Chapter 9: Climate Change is provided at Section 9.

Vulnerability to Accidents and Disasters

2.67 Solar photovoltaic technology is a relatively benign and safe form of electricity generation with very low risk of accident or disaster. The Proposed Development will be enclosed by appropriately designed security fencing and monitored by CCTV, which will lower the risk of unauthorised access.

2.68 An Outline Battery Safety Management Plan (BSMP) has been produced and is included at **Appendix 2.1** (ES Volume 3) of this ES. The Outline BSMP provides a preliminary safety hazard identification and analysis, based on like for like energy storage systems of this type, namely Lithium-Ion Battery technology, and determines the likely causes and hazards associated with BESS technology of this type to enable the initial identification of potential control measures that when implemented will ameliorate the level of risk posed to an acceptable level. In summary the Outline BSMP concludes that as far as reasonably practicable at this stage, that currently foreseeable hazards associated with the equipment have been identified and can be actively managed throughout the life of the Proposed Development.

Construction

2.69 The details of construction methods, timing and phasing are necessarily broad at this stage. The limits of the assessment, however, have been set sufficiently wide to allow a robust assessment to be undertaken of a reasonable worst-case scenario.

2.70 An Outline CEMP is contained within **Appendix 2.2** and an Outline CTMP is contained within **Appendix 2.3** (ES Volume 3). The Proposed Development is anticipated to utilise established standard construction methodologies (including piling) for solar farms.

Indicative Phasing of Construction Works

2.71 The timing of the construction of the Proposed Development would be dependent on securing planning permission and the discharge of planning conditions. The indicative construction programme for the solar element sets out a programme of approximately 12-18 months duration.

2.72 It is assumed that the construction of the solar element is likely to be phased as shown in **Table 2.3** below.

Table 2.2 Indicative Phasing of Construction

Phase	Indicative Dates	Activities
1	Q1 2025	Site preparation (incl. accesses, construction compound, fencing).
2	Q1-Q3 2025	Delivery of construction materials
3	Q2 2025-Q1 2026	Construction and installation of the solar arrays, and associated infrastructure.
4	Q1-Q2 2026	Demobilisation and equipment removal.
5	Q1-Q4 2026	Landscaping including biodiversity enhancements.
6	Q1 2026	Connection.

2.73 Construction of the BESS will take approximately 6-9 months (independent of the overall construction programme). The BESS element of the Proposed Development will be constructed at a later date and is currently expected to be constructed during 2032 and will be completed by 2033.

2.74 The site would be fenced during construction. It is the intention of the Applicant that the site would be registered under the Considerate Constructors Scheme (CCS) or a similar locally recognised certification scheme.

Construction Working Hours

2.75 Construction working hours will be 07:00 to 19:00 hours Monday to Friday, 07:00 to 13:00 hours on Saturday and at no time on Sundays or on public or bank holidays. However, noisy activities such as piling will be undertaken 08:00 to 18:00 hours Monday to Friday and 08:00 to 13:00 hours on Saturday. In the event that works are required outside of these hours in exceptional circumstances, this would be agreed with the WCBC prior to commencement of the activity, as necessary.

Construction Staff

2.76 There will be approximately 100 construction workers during construction for the solar farm, but it is expected there will be a maximum of 75 staff on site at any one time. The number of staff for construction of the BESS will be less. The number of staff on site will vary subject to the overall programme of works and the type of works being undertaken.

Construction Plant and Equipment

2.77 As outlined in **Table 2.4**, plant and equipment required for the construction phase may include but not be limited to the following:

Table 2.3 Construction Plant and Equipment

Equipment	Function
Dump trucks	Earth distribution as required for any levelling
Vibrating roller	Compacting tracks
Piling machine(s)	Ramming piles of mounting frames / fencing posts into the ground
Telehandler(s)	Distributing materials
Crane	Capable of lifting inverters, transformers, battery containers, etc into place
Fuel bowser	Refuel plant as required
Concrete mixer	Foundations for inverters, transformers, battery containers, etc.
JCB Diggers / cable trenching machines	Trenching for cables

Construction Working Areas

2.78 Temporary construction compounds will be required in the southern and northern parcels. The main construction compound will be located in the southern area and will be accessed by construction vehicles via Access 2. Smaller satellite compounds, including one for the BESS, will be required across the northern and southern areas to facilitate access in those areas.

2.79 The temporary construction compounds will house temporary site office space and welfare facilities, an unloading area, and short-term parking for HGVs, temporary storage areas, waste storage and parking for the construction staff. These will be constructed using a hardcore or geogrid base, or similar, and will be removed when the construction phase is complete.

Construction Access

2.80 The main construction access will be off the A525 via Access 2. It would provide a route emerging some 75-100m west of the Heritage Way and A525 Junction. It is proposed that this access is initially created to provide access for the construction phase and then retained as a permanent access for maintenance.

2.81 To provide sufficient width to allow a large articulated vehicle to enter and exit the site safely it is estimated that some 25m of the existing wall will need to be removed. Two trees will also need to be removed and the existing road sign will need to be relocated. It is proposed to retain the stonework from the affected section of wall and use it to create an entrance way to the site with the wall curving round with the radii of the entrance junction.

Construction Vehicles

2.82 There will be approximately 1,200 HGV movements across the course of the solar construction programme (and less for the BESS). Based on a 12-month construction programme and 5.5 day working week this would equate to around 4-5 HGVs (8-10 movements) per day. However, it is recognised that a flat profile across the programme is unlikely, and that there will be peaks in activity associated with overlaps in the construction programme.

Public Rights of Way

2.83 The existing Bersham Public Footpath 1 which runs through the northern and southern parts of the site will be retained. However during construction there may be a requirement to temporarily close or divert the PRoW to ensure public safety.

Environmental Management during Construction

2.84 An outline Construction Environmental Management Plan (oCEMP) and an outline Construction Traffic Management Plan oCTMP (provided at **Appendix 2.2** and **Appendix 2.3** ES Volume 3) provide the framework and requirements for managing the construction activities and movement of traffic to and from the site.

2.85 To avoid or reduce the environmental effects during construction, a number of measures have been designed into the Proposed Development. Details of these can be found within each topic chapter of the ES and are summarised in **Table 2.5** below.

Table 2.5 Schedule of Measures to be Adopted as Part of the Proposed Development during Construction

Topic	Proposed Measures during Construction
General / Design	Construction work will be kept away from tree root protection zones.
Cultural Heritage	Where archaeological remains are found, a programme of archaeological investigation would be developed in consultation with the archaeological advisors to the planning authority. This would enable formulation of an appropriate strategy to avoid, reduce or offset any impacts that could occur.
Landscape and Visual	Trees to be retained and protected in line with the Tree Survey and Arboricultural Impact Assessment (**Appendix 5.8**, ES Volume 3). Planting proposed in the Illustrative Landscape and Ecology Masterplan Plan (**Figure 2.3**) to be implemented at the end of construction to avoid damage by construction.
Biodiversity	As far as possible, the hedgerow network and all the mature and large semi-mature trees will be retained, maintaining the existing higher value biodiversity features

	over the lifetime of the Proposed Development. Stand-offs have been incorporated around ponds where no construction, storage or access will be permitted.
Traffic & Transport	To reduce disruption to the road network as a result of the construction of the Proposed Development as far as practicable, the OCTMP (**ES Appendix 2.3**) sets out management measures which are to be adhered to throughout construction.
Noise & Vibration	Good practice guidance will be implemented throughout the construction stage. Standard industry practice measures would control and manage construction noise to avoid significant adverse effects.
Climate Change	Good practice measures would be followed during the construction process to minimise the impact on climate change. These include: use of pre-fabricated elements to reduce on-site waste; use of local refuse facilities and local materials; and vehicles, equipment and machinery to be switched on only when in use.
Soils	The construction process would take into account the principles of good practice in soil handling and restoration wherever possible, to reduce the possibility of damage to soil materials during the construction process.
Hydrology & Hydrogeology	Good practice construction measures such as exclusion zones around hydrological features where materials are not stored; implementation of pollution prevention measures and dust suppression measures; use of bunded areas to store materials which are at risk of spillage; machinery and vehicles to be kept in good working order; and drainage works to be constructed to relevant statutory guidance.
Agricultural Land	Appropriate construction techniques will be implemented to reduce above and below ground works and to reduce any compaction of soil as far as practicable, mitigating any potential impact on the soil structure and ability to infiltrate water.

Operation and Maintenance

2.86 Once operational, the Proposed Development will be monitored remotely and will not require any permanent staff to be positioned on-site. Occasional maintenance activities will be required, typically for solar panel cleaning and occasional visits for substation upkeep. This would equate to approximately 1-2 visits per month.

Image 6: Example of solar array maintenance at existing operational solar site



Decommissioning

2.87 A solar project is a temporary and fully reversible use, unlike housing for example, with equipment removed from site at the end of the installation's operational life (approximately 40 years). The methods used in construction (limited concrete) mean that remediation works following the removal of the panels and associated infrastructure are relatively minor and will return the site to its previous greenfield character.

2.88 During decommissioning all infrastructure included in the solar farm will be dismantled and removed from the site, as follows:

- Solar Panels - The solar panels will be unscrewed from the mounting frames and packaged to send to a solar recycling depot, or if they are still operational they may be sold as second hand. Since January 2014, PV panels in the UK have been covered by the WEEE (Waste Electrical and Electronic) Regulations, which require recycling of the panels at the end of their operational life. The Applicant is a member of the PV Cycle UK take back scheme for.
- Mounting Frames - The mounting frame horizontal poles will be removed and the piles will be pulled from the ground, the dismantled framework will be bundled and taken for recycling. Because of the slim line 'H' shape of the piles, they will not leave holes like fence posts and therefore only minimal soil back filling is likely to be required, if any.
- Cables - The cable trenches will be reopened, with the top soil set aside, and the cables and ducts will be removed. As the cables are removed, the trenches will be backfilled with the soil that has been set aside. The cables will be bundled and taken for recycling or sale to a scrap metal yard, and the ducts will be disposed of at an approved landfill. Where appropriate, some of the cables may be cut at a point where they are sufficiently buried and decommissioned in situ.
- Associated Equipment - The inverters, transformers, battery and switchgear cabinets / housing will all be removed from the sites using a crane and HGVs for transportation. They can then be broken down off-site, and any reusable parts salvaged for second hand or scrap metal sale, with the remainder disposed of at an approved landfill. The concrete bases for the cabinets / housing will be broken up and removed, this will either be on-sold to aggregate suppliers, or disposed of at an approved landfill. The area where concrete has been removed will then be backfilled with good quality soil.
- Safety and Security – The fencing and CCTV equipment will be removed from the sites and sold on as second hand for reuse. Any holes left by the fence posts and poles will be backfilled with soil.

2.89 Following removal of all infrastructure from the site, and backfilling with soil of any areas requiring it, the sites will be harrowed and seeded in grass, where required. The swales will either be in-filled by new topsoil that will be brought to the site, or retained in place if the landowner considers it will provide an on-going benefit to the land.

2.90 The potential impacts during decommissioning are similar to construction, and therefore similar mitigation and management measures will be implemented during the decommissioning phase.

3 NEED AND ALTERNATIVES CONSIDERED

Need for the Development

3.1 The need for the Proposed Development stems from two sources:

1. Energy security in the context of increasing demand for electricity;
2. The need to decarbonise energy systems and combat the potentially devastating effects of climate change on current and future generations.

3.2 Overall, there is a significant need to increase electricity supply based on predictions of future consumption due to electrification of transportation and heating in particular.

3.3 Given the climate emergency, there is a need for the electricity to be produced from zero or near zero carbon and greenhouse gas emission sources.

3.4 Solar power, and other sources of renewable energy, have an important role to play as part of the mix of energy sources required to meet increasing electricity demand in the future and national carbon and greenhouse gas reduction targets, in particular the Welsh and UK Government's legally binding targets of net zero carbon emissions by 2050.

3.5 In summary, the benefits of this solar and BESS project, include:

- The Proposed Development will generate enough affordable clean electricity to meet the annual equivalent needs of 22,700 households. We are still in a cost-of-living crisis caused in part by high energy bills. Solar is currently one of the cheapest forms of energy generation and this solar farm can help contribute to reducing customers energy bills.
- The Proposed Development will help tackle climate change, the effects of which are clear to see with more frequent extreme weather events. The solar farm will save 15,800 tonnes of carbon per annum, reducing greenhouse gas emissions and helping the UK and Wrexham Council meet their climate targets. Climate change has also been identified as the greatest threat to food security around the world by numerous bodies, including the National Farmers Union.
- Solar and BESS projects can help sustain the farming businesses for the long-term future. By establishing a valuable revenue stream, it will enable the farmer to reinvest back into more productive parts of the farm, ensuring food security. Indeed, the NFU support solar farms for this very reason. Farmers are faced with high fertiliser and energy costs, fluctuating incomes and uncertainty around future subsidies. Moreover, the effects of climate change, with extreme flooding and droughts, significantly reduce farmers yields and can push them out of business if they have not got alternative revenue streams. Various research has shown that even if the UK Government were to meet its target of 70GW of solar by 2035, it would only take up 0.5% of land in the UK.
- The Proposed Development will help contribute to greater energy security in Wales and the UK, and less reliance on importing costly gas from abroad.
- A community benefit fund of £57,000 will jointly be established for Coedpoeth and Esclusham Community Councils, and a further £400,000+ will be invested in local projects and initiatives.
- The application will significantly improve biodiversity in the local area. The new native tree and hedgerow planting, along with new wildflower meadows will create new and enhanced habitats for wildlife.

- The application will also pay business rates to Wrexham Council of around £3.3 million associated with the operation of the solar panels over its 40-year operational lifespan, this figure would increase upon commissioning of the BESS.

Policy Context

3.6 A broad overview of the key national and local policy and guidance relevant to the Proposed Development is provided below.

- Welsh Government Climate Emergency Declaration (2019)
- Welsh Government Commitment to Net Zero (2021)
- Well-being and Future Generations Act 2015
- Future Wales – the National Plan 2040 (FW)
- Planning Policy Wales Edition 12
- Technical Advice Notes (TANs) set out the national planning policies of WG
  - Following the publication of Future Wales, TAN 8: Planning for Renewable Energy has been revoked and there is no longer an energy-specific TAN.
- The Wrexham Local Development Plan 2013 – 2028 adopted December 2023 (LDP).

3.7 An analysis of the Proposed Development having regard to the planning policy and legislative context is provided in the Planning Statement that accompanies this application.

Alternatives Considered

'Do nothing' scenario

3.8 Under the 'Do nothing' scenario, the site would continue to be used for agriculture. The benefits of producing renewable energy to feed into the electricity distribution network and help the Welsh and UK Governments to respond to energy security needs, the climate emergency and reach greenhouse gas reduction and net zero targets by 2050 would not be contributed towards in this scenario.

3.9 The hedgerows and trees would remain in situ and the field margins would continue to be managed. Due to this management (including maintaining short grasses and heights of hedgerows) the habitat value of the field margins would remain species poor under this scenario.

3.10 In contrast, the Proposed Development would result in ecological benefits. The introduction of landscape and biodiversity enhancement areas, together with changing the management regime of the field boundaries (such as alternative cutting programmes and the absence of pesticides and herbicides from spray drift), the diversity of the field margins would increase through establishment of a species rich grassland which include wildflower meadows. The introduction of the habitat enhancement areas would increase habitation for great crested newts and provide a greater variety of flora species. Under the 'Do–nothing' scenario, these benefits would not be achieved.

3.11 The site is currently in agricultural use, largely under grazing. The Proposed Development will continue to allow agricultural use, in particular sheep grazing, across areas of the site.

3.12 In summary, the Proposed Development, compared to the 'Do Nothing' Scenario will maximise the potential benefits of the site as it will enable the generation of green, renewable energy supporting Wales and the UK in meeting targets for Net Zero and energy security, as well as boost biodiversity, whilst allowing for continued agricultural use.

Site Location

3.13 The Applicant is committed to delivering renewable developments across the UK to meet the changing needs of current and future generations. In the context of the current climate emergency and the national commitments to meet net zero targets, there is an increased demand to obtain our energy requirements from green sources across the whole of the UK in locations where renewable technologies are optimised to maximise site efficiencies. The Applicant undertakes continuous nationwide assessments of land opportunities but, in order for schemes to progress, this must be where land is available in agreement with landowners' commitments to supporting the provision of green energy production to meet a sustainable future.

3.14 Large scale ground mounted solar farms are generally located in the open countryside. Sites large enough to accommodate a financially viable scheme, with sufficient MW output, are difficult to find in or close to settlements, particularly the towns and villages that are found in the area local to the Proposed Development, in particular there are:

- Not enough rooftop areas or existing brownfield land available and competition from other high value sectors such as residential and mixed use for such sites;
- Unsuitable roof structures and standards (including roof orientation, shading, presence of plant and other equipment);
- Complex multiple landlords/tenant agreements; and
- Sites within settlements are likely to be considerably more visible to more people.

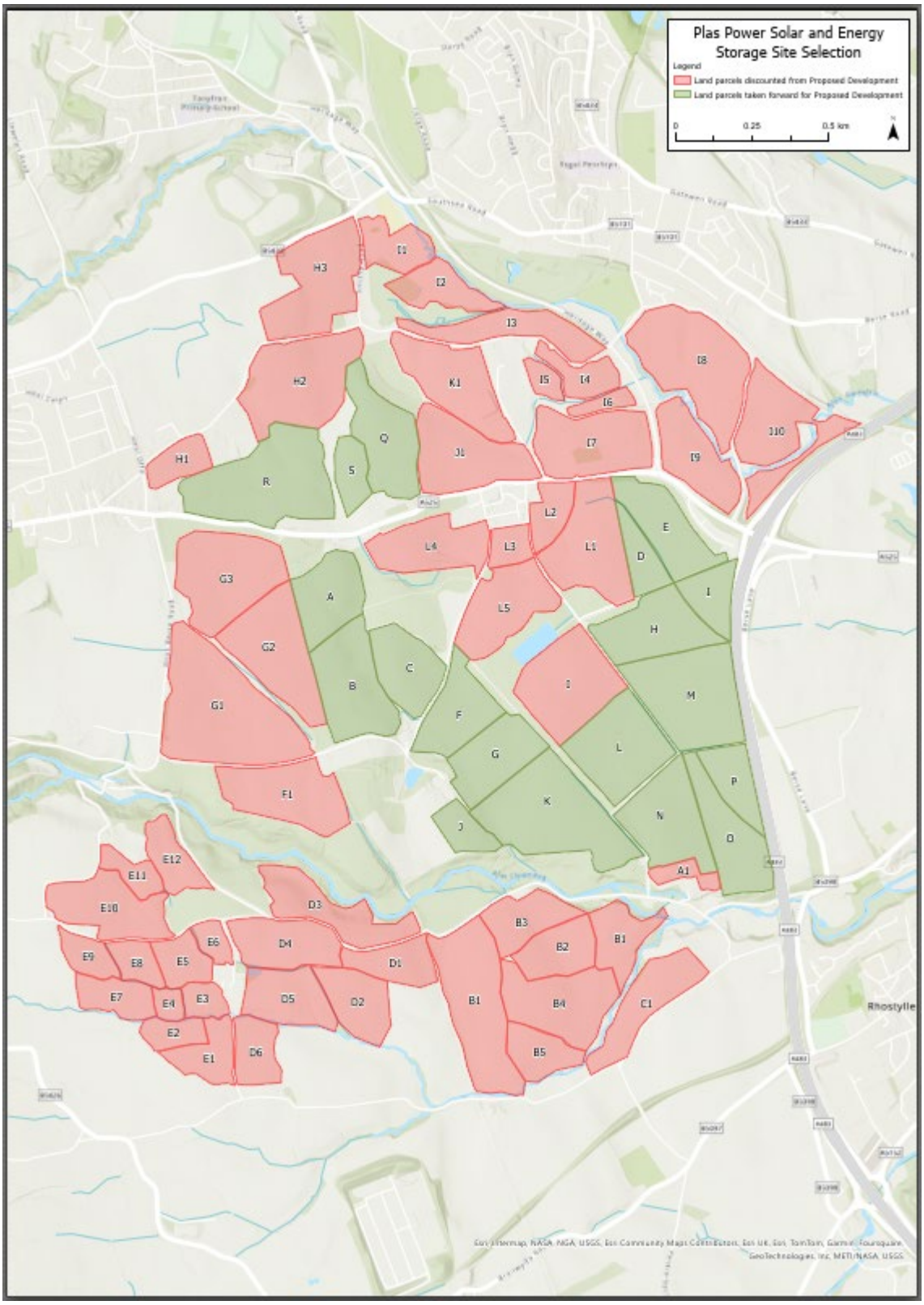
3.15 It is rare to find a previously developed (brownfield) site which meets all the other requirements for a large-scale solar farm, such as grid connection and minimal visual impact.

Site Selection

3.16 Once a potential site location was identified, the Applicant undertook a more detailed site selection process. This process is critical to ensuring that an efficient, technically and economically viable solar farm can be developed without causing unacceptable adverse environmental effects.

3.17 The Applicant considered a number of parcels of land, and fields, in proximity to the Legacy Substation to determine which land parcels would be suitable for solar development. Land parcels with minimal environmental and planning constraints were taken forward for further consideration within the design of the Proposed Development. The site selection process has ensured that there is no alternative development footprint which is more appropriate in terms of environmental impact.

Image 7: Site Selection – Alternative Land Parcel Assessment



Land to the south of the A525

3.18 Central land parcels in the southern area (ref: L5, D, E, F, G, H, I, J, K, L, M, N, O, P and Q) were considered to be suitable due to the lack of planning or environmental constraints identified through desktop assessments; existing well-established screening; absence of BMV land; and appropriate site characteristics including existing access tracks and perimeter drainage ditches. In 2018, parcels

L1, L2, L3 and L4 were discounted due to nearby views from residential properties and undulating topography making it open to views from the A525. Parcel A1 was also discounted due to views from the Bersham Ironworks Museum, residential property and footpath.

Land to the north of the Legacy Substation

3.19 In 2018, land parcels D1, D2, D3, D4, D5 and D6 to the north of the Legacy Substation were assessed by desktop assessment as unsuitable for development due to PRoW and heritage constraints. Land parcels E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11 and E12 to the north of the Legacy Substation were assessed by desktop assessment as being unsuitable for development as the land would be visible from intersecting highways and residential properties.

Land to the west

3.20 In 2019, land parcels to the west of the southern area (ref: F1, G1, G2, G3, A, B and C were assessed. Fields referenced F1, G1, G2 and G3 were assessed and considered less suitable for solar development due to the relationship to Offa's Dyke and proximity to a Local Designated Site of Nature Conservation and Geological Importance to the immediate south. The land was also visible from the adjacent Gate House (Grade II Listed Building) to the south-west corner and to properties along Rhos Berse Road, and opportunities to screen would be limited. The remaining land parcels (ref: A, B and C) were considered better suited for solar development due to the topography, existing screening and accessibility with an internal estate track located to the south of C.

Land to the north-east of the A525

3.21 In 2019, the land parcels within the area of land to the north-east (north of the A525) (land parcels I1, I2, I3, I4, I5, I6, I7, I8, I9 and I10) were assessed, it was determined that the land is mostly Grade 2 agricultural land, with the majority within Flood Zone 3. There are also multiple visual receptors from Southsea and Rhosrhedyn and therefore the land was considered less suitable for solar development and not taken forward for inclusion in the Proposed Development. Also in 2019, Land parcel K1 within the area of land to the north-east (north of the A525) was assessed and after initially being considered suitable was later discounted due to its close proximity with Local Designated Site of Nature Conservation and Geological Importance. The land was also found to be a primary resource coal designated area. In addition to these factors, the land parcel is constrained by two footpaths, is within Flood Zone 3 and has a scheduled monument on the western boundary.

Land to the south of Plas Power Woods and the Clywedog River

3.22 Land parcels B1, B2, B3, B4 and B5 were considered potentially suitable for solar development due to its proximity to the Legacy Substation, topography and existing established screening which provides good visual containment, limiting visibility from sensitive receptors such as residential properties. It was however determined that there were sites of cultural and heritage sensitivity in the area including Offa's Dyke, several Listed buildings and the Bersham Ironworks Scheduled Ancient Monument (SAM). The area also comprised a mix of agricultural land grades, including Grade 2, 3a, and 3b. These parcels were included in the initial proposals consulted on in 2021, and also considered in the EIA Screening and Scoping undertaken in 2021 with PEDW.

3.23 Subject to further environmental assessment and responses to the consultation land parcels B1, B2, B3, B4 and B5 were omitted from the Proposed Development due to the cultural and heritage sensitivities in the immediately surrounding area and the grade of agricultural land, which when surveyed in detail, was assessed to be predominantly BMV.

Land to the north-west of the A525

3.24 In 2021, land parcels to the north (Ref: S, R, T, U, V, H2, J1) were assessed and a site visit was carried out. The majority of the parcels (S, R, T, U and V) are considered suitable for solar development, due to the absence of BMV; accessibility off the A525; established vegetation providing natural screening; and the absence of planning or environmental designations. Field J1 is predominantly Grade 2 and Grade 3a on the ALC Predictive Map and slopes downhill towards the south and has clear views from the A525. It was therefore not considered further. There are small portions of Grade 3a land within a mosaic of Grade 3b to the north in H1, which have also subsequently been removed from the Proposed Development site.

4 EIA METHODOLOGY

Introduction

4.1 This chapter of the ES sets out the approach taken for the EIA of the Proposed Development. The chapter also includes details of the consultation undertaken to date and the overall approach to the assessment of the likely significant effects of the Proposed Development. Further details of topic specific methodologies, such as survey methods, are provided in each topic chapter of this ES.

Scoping

4.2 Scoping is the process of identifying the issues to be addressed during the EIA process. Scoping is an important preliminary procedure, which sets the context for the EIA process.

4.3 A Scoping Direction was sought from Welsh Ministers in October 2020 and a revised Scoping Direction was sought in June 2023 with Scoping Directions received December 2020 (**Appendix 4.2**, ES Volume 3) and October 2023 (**Appendix 4.4**, ES Volume 3) respectively.

4.4 Topics scoped out of the EIA process were:

- Planning Policy
- Material Assets
- Population (Socio-economics), Human Health, Air Quality and Risk of Major Accidents
- Transport
- Agricultural Land Classification
- Land
- Noise and Vibration

4.5 The topics listed below were considered appropriate to be included in the ES.

- Chapter 5: Landscape and Visual
- Chapter 6: Biodiversity
- Chapter 7: Historic Environment
- Chapter 8: Hydrology and Hydrogeology
- Chapter 9: Climate Change
- Chapter 10: Soils

Climate Change Resilience

4.6 Resilience to future climate change has been considered during the design process. The design has taken into account, for example, future flood risk and resilience to extreme weather events. Further details are provided in Chapter 2: Proposed Development Description and Chapter 9: Climate Change. Section 9 of this NTS includes a summary of Chapter 9: Climate Change.

Changes to Future Environmental Conditions

4.7 Consideration of predicted changes in baseline environmental conditions, including changes resulting from climate change, have been set out within each ES topic chapter, where robust

information was available at the time of writing. Details are provided in the methodology section of this chapter.

4.8 The assessment of effects for each topic has taken into account identified trends or changes predicted to arise as a result of climate change.

Key Elements of the General Approach

4.9 The assessment of each environmental topic forms a separate chapter of the ES. For each environmental topic, the following have been addressed:

- Methodology and assessment criteria;
- Description of the current and future environmental baseline conditions;
- Measures adopted as part of the project, including mitigation and design measures that form part of the Proposed Development;
- Identification of likely effects and evaluation and assessment of the significance of identified effects, taking into account any measures designed to reduce or avoid environmental effects which form part of the Proposed Development;
- Identification of any further mitigation or monitoring measures envisaged to avoid, prevent, reduce and, if possible, offset adverse effects (in addition to those measures that form part of the Proposed Development);
- Assessment of any cumulative effects with other developments planned in the area; and
- Assessment of any relevant inter-related effects between topics.

Methodology and Assessment Criteria

4.10 Each topic chapter provides details of the methodology for baseline data collection and the approach to the assessment of effects. Each environmental topic has been considered by a competent expert in that area, the professional qualifications and relevant project experience relevant to the technical specialists that have produced the assessments in this ES are provided within **Appendix 1.4** (ES Volume 3).

Description of the Environmental Baseline Conditions (Including Future Baseline Conditions)

4.11 The existing and likely future environmental conditions in the absence of the Proposed Development are known as ‘baseline conditions’. Each topic chapter includes a description of the current and future (baseline) environmental conditions. The baseline conditions at the site and within the study area form the basis of the assessment, enabling the likely significant effects to be assessed through a comparison with the baseline conditions. The baseline for the assessment should represent the conditions that will exist in the absence of the Proposed Development at the time that the project is likely to be implemented. A precautionary approach to assessment is taken, accounting for inherent uncertainties in the evolution of the baseline.

4.12 The baseline for the assessment of environmental effects is primarily drawn from existing conditions during the main period of the EIA work in the period 2020 to 2023.

Mitigation Measures Adopted as Part of the Project

4.13 During the EIA process, environmental issues have been taken into account as part of an ongoing iterative design process. The process of EIA has therefore been used as a means of informing the design.

4.14 The Proposed Development assessed within this ES therefore includes a range of measures that have been designed to reduce or prevent significant adverse effects arising. In some cases, these measures may result in enhancement of environmental conditions. The assessment of effects has taken into account measures that form part of the Proposed Development.

Assessment of Effects

4.15 The assessment is based on consideration of the likely magnitude of the predicted impact and the sensitivity of the affected receptor.

Sensitivity or Importance of Receptors

4.16 Receptors are the physical or biological resource or user group that would be affected by the Proposed Development. Some receptors will be more sensitive to certain environmental effects than others. Sensitivity takes into account factors including:

- Vulnerability of the receptor
- Recoverability of the receptor
- Value/importance of the receptor.

Magnitude of Impact

4.17 Impacts are the physical changes to the environment attributable to the Proposed Development. The categorisation of the magnitude of impact is topic-specific but generally takes into account factors such as:

- Extent
- Duration
- Frequency
- Reversibility

4.18 With respect to the duration of impacts, the following has been used as a guide within this assessment, unless defined separately within the topic assessments:

- Short term: A period of months, up to one year
- Medium term: A period of more than one year, up to five years; and
- Long term: A period of greater than five years.

4.19 The magnitude of an impact has generally been defined used the following scale:

- High;
- Medium;
- Low; and
- Negligible.

4.20 In some cases, a further category of ‘no change’ has been used.

Significance of Effects

4.21 Effect is the term used to express the consequence of an impact (expressed as the 'significance of effect'). This is identified by considering the magnitude of the impact and the sensitivity or value of the receptor.

4.22 The magnitude of an impact does not directly translate into significance of effect. For example, a significant effect may arise as a result of a relatively modest impact on a resource of national value, or a large impact on a resource of local value. In broad terms, therefore, the significance of the effect can depend on both the impact magnitude and the sensitivity or importance of the receptor having regard to the matrix below.

Table 4.1 – Typical Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

4.23 Unless set out otherwise in relation to a topic, effects assessed as moderate or above are considered to be significant in terms of the EIA Regulations within this assessment.

Further Mitigation and Future Monitoring

4.24 Where required, further mitigation measures have been identified within topic chapters. These are measures that could further prevent, reduce and, where possible, offset any adverse effects on the environment.

4.25 Where relevant and necessary, future monitoring measures have been set out within the topic chapters.

Assessment of Cumulative Effects

4.26 The EIA Regulations require consideration of cumulative effects, which are effects on a receptor that may arise when the Proposed Development is considered together with other Proposed Developments in the area.

4.27 Each topic chapter (ES Volume 1 Chapters 5: Landscape and Visual Impact), Chapter 6: Biodiversity, Chapter 7: Cultural Heritage, Chapter 8: Flood Risk and Drainage, Chapter 9: Climate Change and Chapter 10: Soils) contains a cumulative assessment for that topic of cumulative developments which are identified in **Appendix 4.7 Cumulative Developments**.

Consultation

4.28 Meetings have been undertaken throughout the EIA and design process to develop and/or agree methodologies and request and share information regarding existing environmental conditions.

4.29 Pre-application advice was sought from WCBC in December 2019, March 2022 and July 2023. In addition, topic specialists have consulted the relevant experts within WCBC and their consultees on their approach to the EIA through the Scoping process.

4.30 The applicant undertook non-statutory consultation with local residents in a defined consultation zone (circa. 2-mile radius of the site) between June and July 2023 which included the following:

- A newsletter;
- Dedicated website;
- A consultation summary brochure;
- A press release;
- Webinar; and
- Four public exhibitions

4.31 As part of the consultation process, the Applicant has engaged with the local community to inform local people about the Proposed Development, to explain its likely effects and to take on board any matters raised. A summary of the statutory pre-application public consultation carried out is set out below.

- Letters were issued to neighbouring properties and statutory consultees that set out the proposed development and how to comment on the proposals.
- The statutory consultation was also advertised in the local paper.
- As referred to in the letters, a website was set up for the Proposed Development.
- Site notices were also erected at locations around the site.

4.32 A PAC report will be submitted with the application providing details of all the consultation undertaken, both statutory and non-statutory.

4.33 Comments received will be taken into account by the design team in the final preparation of the planning application and, where relevant, in the EIA process and/or other application documents.

5 LANDSCAPE AND VISUAL

Assessment Methodology

5.1 The Landscape and Visual Impact Assessment (LVIA) has considered the existing landscape and visual resources within the site and a surrounding 5km radius study area. This includes identification of the character and features of the landscape and consideration of the changes that would result because of the construction and operation of the Proposed Development. A computer-generated zone of theoretical visibility (ZTV) was mapped to identify the areas from which the Proposed Development would be potentially visible.

Baseline Environment

5.2 The overall land use of the site is agricultural with its landscape character having been influenced by a combination of its current agricultural land use and historical associations derived from its former uses that include coal extraction, the Plas Power Estate and the former iron works at Bersham that are still evident within the landscape today.

5.3 Modern day development has also affected the character of the site with urban development on the periphery of Wrexham having expanded towards the east of the site and includes the A525 and A483 running to the north and east respectively. Plas Buckley Road runs to the south of the site and has influenced the sites character to a lesser extent due to the woodland that contains the road and the river corridor.

Mitigation Measures Adopted as Part of the Proposed Development

5.4 Landscape mitigation is embedded in the overall design and has been formulated in order to minimise potential landscape and visual impacts and maximise enhancement of landscape features, landscape character and biodiversity of the site.

5.5 The landscape proposals are shown on the Illustrative Landscape and Ecology Masterplan, (**Figure 2.3**). The design has been informed by experience of similar developments and good practice guidance relating to retention and enhancement of trees and hedgerows. With the input of an ecologist where required, for example, but not limited to, when considering landscape buffers between solar panels and ecologically important retained trees or enhancement areas for specific species.

5.6 The landscape proposals include the following measures:

- internal and boundary hedgerow reinforcement appropriate to the arable and pastural fields that would improve the site's existing field structure, enhancing biodiversity and habitats for local wildlife and provide additional screening of the site and solar PVs within views.
- woodland edge scrub planting is proposed adjacent to existing areas of established woodland to improve connectivity and integration within the site. Areas of Ancient Woodland to be retained and protected.
- structural woodland planting is proposed for the landscape treatment, where space allows and to help screen views of the solar PVs and enhance the wooded character within the site.
- various meadow grassland mixes are proposed for different habitat creation that include a tussocky grassland for grazing beneath the solar PVs, woodland meadow for the

connectivity of areas adjacent to existing woodland, wetland meadow of wet areas and a wildflower meadow.

Assessment of Construction Effects

5.7 During the construction phase, construction activities including vegetation removal, the use of construction machinery that includes small cranes and vehicle movements on site would be visible from the surrounding area, to varying degree where not obstructed by existing vegetation that includes woodland belts, hedgerows and mature trees. Construction activities would appear as new elements within existing views.

5.8 The majority of construction activities would be associated with the installation of solar panels within the Northern and Southern land Parcels. For this, construction would be carried out in individual areas at a time, and once the solar panels in an area have been installed, construction operations would move on to another area. As the construction phase progresses visual effects associated with the installed solar panels would increase, as more of the solar panels become potentially visible. Once the solar panels have been installed and construction has moved to another area, potential visual effects of that area would be comparable to those of the completed operational phase of the Proposed Development. Localised obstruction to near views at Viewpoints 1 and 2 will likely result in these viewpoints experiencing significant visual effects during construction.

5.9 Construction activities associated with the installation of the BESS Compound would be located in the south of the southern parcel and screened to the south and west by existing mature woodland located along the Clywedog Valley. Construction activities associated with the cable route would also be carried out in individual areas at a time as detailed above for the installation of the solar panels. However once construction works have finished in an area, the area would be reinstated and there would be no above ground elements present in view (the cable route runs underground). The only potential visual difference would be in areas where any vegetation clearance has been carried out. Views of construction activities and vehicle movements would cause disruption within the view where views are obtained, although these effects would be short term.

5.10 Overall, the significance of effects on landscape resource during the construction phase ranges from no change to Moderate Adverse which is not significant in EIA terms.

5.11 The significance of effect on VP1 and VP2 at winter year 1 is likely to be Major Adverse which is significant in EIA terms. This effect is described in paragraph 5.15 below.

Assessment of Operational Effects

5.12 The Proposed Development would introduce a large-scale solar farm within an area of agricultural fields located to the south-west of Wrexham town centre and to the north-east of the Esclusham Mountains, Area of Outstanding Natural; Beauty (AONB). Areas in the south of the site were formerly used for open cast mining, fall within the Plas Power Estate and contain a small area of plantation woodland. Ancient woodland lies adjacent to the west of the site and PRoW (BER/1) runs north-south within the site providing public access.

5.13 The north of the site sits in the context of the urban fringe of Wrexham and the south in the context of Bersham Conservation Area that contains the historic associations that include the iron museum works and recreational associations with the Clywedog Trail running adjacent to the River Clywedog. Subtle historic references to the former Plas Power Estate remain local characterising features of this local landscape, including the estate walling, listed buildings and planted parkland trees would all remain intact.

5.14 Given the Proposed Development would be long-term but fully reversible and at a low level, the landscape structure can be retained and improved, and the site is well contained, there are no significant effects upon the local landscape character due to the Proposed Development anticipated.

5.15 In terms of views, the site is low lying and well buffered by existing boundary vegetation with views being close ranging, from the PRoW (BER/1) that runs within the site and longer distance views being obtained from elevated land to the east that includes the Clwydian Range and Dee Valley AONB. It is anticipated that a solar scheme of this scale would cause some localised obstruction to near views with Viewpoints 1 and 2 that are located within the site experiencing significant visual effects during construction and in year 1 of operation. However, the full extents of the scheme would not be viewed in its entirety, given the existing baseline context includes field boundary hedgerows and areas of woodland within the view, and accounting for the mitigation proposed as part of the Proposed Development these effects would not be considered significant by year 15 of operation.

5.16 Distant views would be longer ranging and encompass a larger extent of the scheme, however given the distance the solar panels would not form an overly opponent feature in the view with long and short distance views often being interrupted by vertical elements of pylons. No other likely significant effects arising from the Proposed Development are anticipated.

5.17 Overall, the significance of effects on landscape resource during the operation phase ranges from no change to Moderate Adverse which is not significant in EIA terms.

5.18 The significance of effect on VP1 and VP2 at winter year 1 is likely to be Major Adverse which is significant in EIA terms. The impact is due to close-range views being channelled along the route of the green corridor that forms the route of the PRoW. The channelling of open views would be partially offset by enhancements to the setting of the PRoW that include wildflower grassland and hedgerow improvements.

Assessment of Decommissioning Effects

5.19 Predicted effects upon the landscape and visual resource during the decommissioning of the Proposed Development would be equivalent to those experienced during construction for the duration of the phase, with the small exception of the proposed vegetation having reached maturity which would offer some limited screening of low-level works within the localised views. The decommissioning of the Proposed Development is not anticipated to cause any significant effects upon the landscape or views. Significant effects proposed upon VP1 and VP2 during construction would be reduced to not significant due to mitigation planting having reached maturity and being retained beyond decommissioning offering screening to proposed works.

5.20 Assuming the Proposed Development is fully removed, and the site restored to cleared ground for grazing and crop growing, this would slightly open up the local views as due to the removal of the built elements. Where appropriate, planting and grassland would be protected during removal of the Proposed Development. Hedgerows within specimen trees and enhance existing hedgerows would remain in place and managed, continuing to retain a good landscape structure appropriate to the local landscape character. New woodland planting and management would continue to offer some landscape improvements to the local landscape condition.

5.21 There would be no significant effects upon the landscape or visual resource during decommissioning.

Assessment of Cumulative Effects

5.22 The significance of cumulative effects on the existing landscape character and visual resources of the Proposed Development with other schemes that are allocated, consented or for which planning

permissions are currently being sought within a 5 km radius of the Proposed Development has been assessed. The assessment also includes proposed developments for which it can be determined are reasonable likely to come forward (e.g. those for which Scoping Reports have been submitted).

5.23 If all cumulative schemes were fully built out, they would intensify the built form of residential development and energy storage infrastructure on the fringe of Wrexham within the study area. Permanent effects on the urban fringe of Wrexham within the study area would occur as a result of the cumulative effects of these cumulative schemes together with the reversible, long-term (40 years) effects of the Proposed Development.

5.24 The in-combination effects of the cumulative schemes in association with the Proposed Development would increase the overall level of built development within the landscape. However, it is considered that overall, the study area has the capacity to absorb the cumulative schemes and the Proposed Development without any significant cumulative effects on landscape character during both its construction and operational phases.

Inter-relationships

5.25 There are inter-relationships between landscape and visual effects and other topic chapters included within this ES. These include synergies with ecology and nature conservation, arboriculture and with hydrology and flood risk that have influenced the design.

5.26 The proposed planting and varied grassland planting are designed to provide landscape integration, connectivity and visual screening within and from outside the site. The planting would have a dual function of providing visual interest and assimilation while providing wildlife corridors and continued nature conservation links with adjacent areas of ecological importance. The provision of sustainable drainage features has also been considered as part of the landscape design to provide mitigation where possible within the Proposed Development.

Summary of Effects

5.27 The full extents of the scheme would not be viewed in its entirety and, given the existing baseline context that includes field boundary hedgerows and areas of woodland within the view, this would not be considered significant.

5.28 Distant views would be longer ranging and encompass a larger extent of the scheme, however given the distance the solar panels would not form an overly opponent feature in the view with long and short-distance views often being interrupted by vertical elements of pylons.

5.29 The Proposed Development provides opportunities for enhancements to the existing field structures and ecological value of the site that would be long term and beyond the 40-year duration of the Proposed Development.

5.30 Overall, the quality and character of the landscape and visual resources would be maintained and would have the capacity to accommodate the Proposed Development without significant effects.

6 BIODIVERSITY

Assessment Methodology

6.1 The study area for terrestrial ecology extends up to 2 km from the site for non-statutory designated sites and species records, 5 km for statutory designated sites and 10km for European (international) designated sites. The study area for the baseline habitat surveys was the site and the adjoining habitat. The study area for great crested newts (GCN) included waterbodies within 500m of the site.

6.2 A Preliminary Ecological Appraisal of the site undertaken by RPS in 2020 informed the scope of further assessments undertaken. Protected species surveys have been undertaken by RPS at the site between 2020 – 2023.

6.3 The following surveys and reports were undertaken in 2022 – 2023 to update previous work: phase 1 habitat survey and preliminary ecological appraisal, wintering bird survey and great crested newt survey. Further details of the survey scope and timing are provided in the relevant Appendices.

6.4 The following baseline studies and surveys have been undertaken for this assessment:

- Preliminary Ecological Appraisal (Appendix 6.1, ES Volume 3);
- Breeding bird survey completed over three early morning transect survey visits to record the assemblage of species using the site (Appendix 6.2, ES Volume 3);
- Wintering bird survey completed over four early morning transect survey visits to record the assemblage of species using the site (Appendix 6.3, ES Volume 3);
- Great crested newt surveys comprising Habitat Suitability Index (HSI) assessment of on-site ponds, environmental DNA (eDNA) survey and populations assessment survey 2023 (Appendix 6.4, ES Volume 3);
- Great crested newt surveys comprising Habitat Suitability Index (HSI) assessment of on-site ponds, environmental DNA (eDNA) survey and populations assessment survey 2021 (Appendix 6.5, ES Volume 3);
- Otter survey to determine the suitability of habitat within and adjoining the site for otters and check for signs of otter activity (Appendix 6.6, ES Volume 3);
- Shadow Habitat Regulations Assessment (Appendix 6.7, ES Volume 3);
- Outline Landscape and Ecology Management Plan (Appendix 6.8, ES Volume 3);
- Biodiversity Net Gain Report (Appendix 6.9, ES Volume 3); and
- Great Crested Newt Mitigation Strategy (Appendix 6.10, ES Volume 3).

6.5 The assessment of ecological effects from the Proposed Development focusses on ‘important ecological features' (IEFs). These are species and habitats that are valued in some way and could be affected by the Proposed Development. Other IEFs may occur on or in the vicinity of a Proposed Development but do not need to be considered because there is no potential for them to be significantly affected.

6.6 In assessing the magnitude of impacts, consideration has been given to the fragility or stability of the habitats and the sensitivity of the species potentially affected by the Proposed Development. Fragile habitats are those which are readily damaged by human activity. Fragility and stability can be expressed in terms of the degree of change in species abundance and composition following

disturbance. Sensitive species are those that are highly susceptible to disturbance, for example as a direct disturbance as result of human activity, noise etc., or the loss of key habitats used by a species that are not present in the surrounding area.

Baseline Environment

6.7 The site comprises improved pasture fields and arable bounded by hedgerows. Mature trees are present in some of the hedgerows. Few areas of semi-improved grassland and field ditches are present. Several blocks of woodland adjoin the site including Big Wood Local Wildlife Site through which the River Clywedog flows. Ponds are present in the offsite woodland.

6.8 Otters use the section of the River Clywedog adjoining the site and the population has district level importance.

6.9 The site supports wintering bird populations of up to county level importance. Habitat within and adjoining the site has potential to support dormouse populations of up to county level importance.

6.10 Populations of bats, water vole, breeding birds, and great crested newt using the site have up to local level importance.

6.11 Populations of hedgehog, reptiles and invertebrates have site level importance.

6.12 There are four designated sites with importance for nature conservation at an international scale within 10km of the site, the closest of which is 1.69km from the site.

6.13 Three designated sites with importance for nature conservation at a national scale are within 10km of the site, the closest of which is 1.16km from the site.

6.14 There are 17 non-statutory designated sites with county importance for biodiversity located within 2km of the site. This includes Higher Berse Marsh Wildlife Site and Big Wood Wildlife Site (WS) which adjoin the site and the Afon Gwenfro WS located beyond the B5430.

Mitigation Measures Adopted as Part of the Proposed Development

6.15 The Proposed Development landscaping is shown on the Illustrative Landscape and Ecology Masterplan (**Figure 2.3**). The Illustrative Landscape and Ecology Masterplan includes measures to enhance biodiversity, including:

- Areas of winter cover crop will be created to provide a foraging resource for wintering birds.
- New areas of wildflower and tussocky grassland will be created.
- A new pond will be created in the Biodiversity Enhancement Area.
- New hedgerows will be planted and existing gappy hedgerows will be infilled.
- The new habitat creation will enhance connectivity for foraging bats.

Assessment of Construction Effects

6.16 During construction, arable land will be converted to grassland resulting in a significant change in the habitat composition of the site. Other habitat loss will be limited to localised areas of improved and semi-improved grassland and hedgerow and will have negligible adverse effects. Retained

hedgerows, mature trees, ditches and offsite woodlands, ponds and watercourses will be protected through stand-offs. The effects will not be significant in EIA terms.

6.17 During construction, there is potential for ground-nesting birds to be disturbed by works in the pasture and arable fields. The effect will be negligible adverse and will not be significant in EIA terms. There will be a temporary loss of arable, a foraging resource for wintering birds, which has potential to have a minor adverse effect, which is not significant in EIA terms.

6.18 Full implementation of environmental good practice by all the site contractor teams will prevent potential impacts from direct damage or pollution during construction.

Assessment of Operational Effects

6.19 The operational site will create new areas of habitat within the site and increase the value of existing habitat. As a result, there is potential for a minor beneficial effect on breeding birds, great crested newt, reptiles and invertebrates which is not significant in EIA terms.

Assessment of Decommissioning Effects

6.20 Predicted effects upon biodiversity during the decommissioning stage of the Proposed Development would be equivalent to those experienced during construction for the duration of the phase. The potential for impacts during the decommissioning phase are therefore considered to be consistent with those identified for the construction phase.

6.21 Potential environmental impacts during the decommissioning phase will be managed through implementation of management measures to be specified ahead of the decommissioning phase commencing. These would be specified in decommissioning environmental management plans and/or method statements.

6.22 Full implementation of environmental good practice by all the site contractor teams will prevent potential impacts from direct damage or pollution during decommissioning.

Assessment of Cumulative Effects

6.23 The Proposed Development will provide a net biodiversity benefit through the retention of higher value habitats within the site and creation of new habitats with biodiversity value.

6.24 The nearby proposed developments include some of the same habitat types present within the site (arable, grassland and hedgerows). Each of the developments assessed are separated from the Proposed Development. There is a minimum distance of 270m between the assessed developments and solar farm arrays within the proposed development where the majority of construction work will be undertaken and there are therefore no impact pathways identified which would result in cumulative impacts.

6.25 Given the low impact nature of the Proposed Development, separation from nearby developments and creation of new habitats there is negligible potential for cumulative impacts with nearby proposed developments. There will therefore be no effects which are significant in EIA terms.

6.26 The Proposed Development avoids adverse impacts on the majority of protected species and potential cumulative impacts would therefore primarily relate to breeding and wintering birds.

6.27 It is assumed that nearby cumulative developments will result in the loss of the majority of arable habitat within these developments. During construction, there will be a loss of arable habitat within

the Proposed Development. Given the low numbers of ground nesting birds (skylark, meadow pipit) the potential impact of the Proposed Development and cumulative impacts are negligible.

Inter-relationships

6.28 There are inter-relationships between the ecology assessment and Chapter 5: Landscape and Visual Impact, Chapter 8: Hydrology and Flood Risk and the construction programme. The proposals have evolved with input from each of the technical disciplines to inform the site layout and landscape scheme. The landscape scheme has been designed to provide value for biodiversity whilst satisfying the LVIA requirements and the hydrology of the site.

Summary of Effects

6.29 All statutory and non-statutory designated sites are located over 1km from the Proposed Development. A 25m stand-off will protect Big Wood WS and Higher Berse Marsh WS from all construction activities. Good environmental practice will need to be implemented during the landscaping (grassland creation) in the buffer zone. There are no anticipated impacts on statutory designated sites or non-statutory sites during construction or operation.

6.30 The sensitivity of habitats within the site is considered to be low to negligible and adjoining the site is up to medium. Stand-offs will be implemented around higher value habitat including field boundaries and adjoining woodland, watercourses and waterbodies. The substantial separation of the working area from the River Clywedog will avoid potential impact pathways. The biodiversity value of the site will be maintained and enhanced through sensitive design enabling the retention of all higher value features and the creation of new habitats with value for wildlife. The Proposed Development would result in the conversion of low value habitat, primarily arable farmland to grazing pasture with neutral grassland boundaries.

6.31 It is considered that overall the Proposed Development will result in a direct, permanent, long-term, beneficial, residual effect of up to minor significance which is not significant in EIA terms.

6.32 The design has taken into account wildlife present within and adjoining the site. There will be minimal temporary loss of grassland and hedgerow habitat suitable for GCN, reptiles, dormouse and nesting birds. The wooded habitats adjacent to the site will not be adversely affected by the development proposals with no potential impact on their use by otter. Confirmed resting places on the River Clywedog lie a significant distance from the boundary of the development. The otter population for which the River Clywedog forms part of their territory will not be affected by the proposals.

6.33 Very low numbers of ground nesting birds may be displaced into adjoining arable. The potential requirement for the felling of individual trees to enlarge access points within the site has a low likelihood of affecting a bat roost. The sensitive timing of works and species protection measures will protect any populations present. Trees and all hedgerows will be retained protecting the potential value of the site for roosting bats.

6.34 Replacement foraging habitat for wintering birds will be created. The creation of new ponds, hedgerows, tussocky grassland and wildflower grassland will benefit a range of species including GCN. Grassland and pond creation alongside hedgerows will maintain flightlines and have the potential improve the value of the site for foraging bats.

6.35 The long-term management with biodiversity objectives, supported by targeted monitoring, is designed to deliver benefits for habitats and species. Overall, the Proposed Development will develop higher value for biodiversity than the existing site with the potential for a minor positive effect of significance in the context of the site.

7 CULTURAL HERITAGE

Assessment Methodology

7.1 The Proposed Development has been assessed for potential impacts on the historic environment. It assesses the likely significant effects on known and potential buried archaeological remains within and in proximity to the site, as well effects to archaeological and built heritage assets in the surrounding area. This chapter is informed by the results of an Archaeological Desk-Based Assessment (DBA, Built Heritage Statement, Geophysical Surveys and Trial Trenching.

7.2 A study area of 1km beyond the site boundaries has been used for assessment of the potential for unknown archaeological remains to be present within the site. A study area extending 1km is widely accepted as being appropriate in rural contexts for the assessment of archaeological potential. It generally provides sufficient background data to support the assessment without gathering large amounts of extraneous data with no direct bearing upon the archaeological potential of the site.

Baseline Environment

7.3 The baseline studies established that there are no designated archaeological or built heritage assets (of High sensitivity) within the main body of the site.

7.4 Within 3km of the site, there are:

- 44 Scheduled Monuments;
- 287 Listed Buildings;
- Six Conservation Areas; and
- Two Registered Historic Parks and Gardens.

7.5 The geophysical surveys recorded a number of anomalies within the site that were considered to be of possible archaeological origin and others that were of uncertain origin. Trial trenches were subsequently excavated to determine their archaeological interest. The archaeological features encountered by the trial trenching comprised ditches and gullies that appeared to be of agricultural function. Most were undated but are likely to be Post-Medieval or later. They are considered to have very little archaeological interest. Several anomalies were found to be of geological origin.

7.6 A Low archaeological potential was identified for all periods of human activity in the Archaeological Desk Based Assessment and associated evaluation fieldwork. It was assessed that any archaeological remains within the site would be of local importance, therefore of Low sensitivity.

Mitigation Measures Adopted as Part of the Proposed Development

7.7 Construction phase impacts upon buried archaeology have been reduced through measures embedded in the design of the Proposed Development. As part of the baseline surveys, a geophysical survey was undertaken, which took in land outside the current Site. It identified anomalies thought to represent the remains of a monastic grange, possible barrows and bell pits relating to early coal mining. The areas in which these anomalies were recorded have been excluded from the Site. Consequently, potential impacts upon them have been prevented.

7.8 An area of upstanding ridge and furrow is located in the western part of the site. No ground disturbance is proposed here; providing for its preservation in situ and preventing any adverse impact. Where possible, historic hedgerows have been maintained within the site layout.

Assessment of Construction Effects

7.9 Features of limited archaeological interest have been identified by the geophysical survey and trial trenching. These will be subject to localised disturbance during construction as a result of the driving of piles supporting the solar arrays and the construction of an access track. This will result in limited disturbance and hence potentially some loss of archaeological data and an adverse impact of, at most, Low magnitude. The features are considered to be of negligible sensitivity and this will equate to an effect of **Negligible** significance. This is not significant in EIA terms.

7.10 The Site is considered to have low potential to contain hitherto unrecorded archaeology. Given the results of the geophysical survey and trial trenching and the very small proportion of the Site that will be disturbed, it is considered that there is negligible potential for hitherto unrecorded archaeology to be affected.

7.11 The construction phase of the Proposed Development will result in an introduction of plant to the site, an increase in activity on the site as a result of construction operations, and potential increase in vehicular activity on the routes leading to the site. These changes would result in a short term, temporary, negligible magnitude of impact. This would give rise to a short term, temporary, Negligible/Minor significance of effect which is not significant in EIA terms.

Assessment of Operational Effects

7.12 The operational phase of the Proposed Development will not have any direct physical effect on archaeological remains within the site as it has been assumed that the construction phase of the Proposed Development will have disturbed any remains which may be present as a result of excavation, earthworks and other below ground construction activities.

7.13 The Proposed Development will potentially affect the settings of fifteen heritage receptors through changes to their extended settings. For the identified heritage receptors, no effects greater than of Minor Adverse significance were identified which is not significant in EIA terms.

7.14 The operational phase of the Proposed Development would cause a change within the settings of the above heritage receptors. The Proposed Development is, however, fully reversible at the end of its ‘lifespan’ (up to 40 years). Due to the nature of the impacts and significance of effect in the operational phase described above, further mitigation measures are not considered likely to be required in terms of heritage.

Assessment of Decommissioning Effects

7.15 Ground disturbance associated with decommissioning phase will be restricted to those areas disturbed during the construction phase. It is therefore considered that there is no potential for decommissioning to affect the physical fabric of any heritage assets.

7.16 Decommissioning effects relating to setting would be equivalent to those detailed in the construction phase assessment. No significant effects are therefore predicted.

Assessment of Cumulative Effects

7.17 The assessment of cumulative effects considers the impacts and significance of effects associated with the Proposed Development for the historic environment alongside other relevant cumulative developments identified.

7.18 The cumulative assessment concludes that there is no potential for cumulative physical effects between the Proposed Development and other cumulative development schemes owing to the distance which exists between the site and other schemes.

7.19 The cumulative assessment also identifies that there is no potential for cumulative effects relating to the settings of heritage assets owing to lack of visibility in combination from any such designated heritage assets and the Proposed Development with any other cumulative development scheme.

Inter-relationships

7.20 There is an inter-relationship between Chapter 7: Cultural Heritage and Chapter 5: Landscape and Visual Impact. The synergies between these chapters are limited, however, insofar that different methodologies are applied with respect to the assessment of any heritage assets included as visual receptors. As such, the findings between the chapters with respect to heritage assets may vary. There are no inter-relationships with other chapters; given the nature of the archaeological resource and the development, there is no potential for effects to arise as a result of factors such as changes in hydrology or soil chemistry.

Summary of Effects

7.21 Construction activities would result in an impact of Low magnitude upon the archaeological features recorded within the Site. Based on the results of the trial trenching these are considered to be of very limited archaeological interests and therefore of negligible sensitivity. The level of disturbance and consequent loss of archaeological data would be slight, resulting in an impact of Low magnitude. This is considered to represent an effect of Negligible significance. Given the results of the geophysical surveys and trial trenching and the very small proportion of the Site that will be disturbed during construction, it is considered that there is negligible potential for hitherto unrecorded archaeology to be affected.

7.22 Removal of small sections of hedgerows may be necessary during construction. The hedgerows meet the criteria for important historic hedgerows under the Hedgerow Regulations. They are considered to be of local importance and low sensitivity. The loss of small sections would result in an effect of minor significance.

7.23 Construction operations may result in change in the setting of heritage assets as a result of factors such as plant movement, increased traffic, construction compounds and noise. Such change will be temporary, ceasing at the end of the construction phase, and may occur only intermittently or be transitory. As such they are unlikely to be significant.

7.24 The operational phase of the Proposed Development will not have any direct physical effect on archaeological remains within the site as this will not typically involve any ground disturbance. If ground disturbance is required, for example where repairs are necessary to buried infrastructure, this will be contained within ground disturbed during the construction phase of the Proposed Development. There is therefore no potential for operational effects upon buried archaeology.

7.25 The operational phase of the Proposed Development would cause a change within the settings of some heritage receptors. The Proposed Development is, however, fully reversible at the end of its ‘lifespan’ (up to 40 years). The effect is considered to be, at most, Minor to Negligible Adverse, which is not significant in EIA terms.

8 HYDROLOGY AND HYDROGEOLOGY

Assessment Methodology

8.1 Chapter 8 of the ES assesses the likely significant effects of the Proposed Development on drainage and flood risk, both to the site and the surrounding area.

8.2 There are no specific EIA guidelines in relation to assessing the effect of solar and energy storage facilities on water resources, and flood risk. The assessment methodology, therefore, is adapted from the guidance provided in the Design Manual for Roads and Bridges (DMRB) LA104 (Environmental Assessment and Monitoring) and LA113 (Road Drainage and the Water Environment). This guidance provides the robust methodology for infrastructure developments.

8.3 The site area has been taken as the site boundary, with a 1km buffer considered for the solar and BESS site. The 1km buffer is considered appropriate for data collection taking into account the nature of the development and likely zone of influence on hydrological receptors. Given the landscape surrounding local land use activities, it would be difficult to ascertain the exact source of any impacts on water quality beyond 1km. Previously a 250m buffer was agreed as part of the ES scoping report but, this has since been increased given the potential inclusion of BESS. A 250m buffer has been applied to the cable route. This is considered appropriate due to the nature of the development, with no permanent changes to terrain.

Baseline Environment

8.4 A review of published OS maps and NRW data shows the Proposed Development does not have any main watercourses or ordinary watercourses present at the site. Agricultural field drains are present at the site. There are watercourses in proximity. These watercourses all form part of the River Dee catchment. A tributary of the River Gwenfro is located approximately 260m north east. The site is situated within the middle extent of the River Gwenfro catchment.

8.5 The River Clywedog is located approximately 45m south, this flows in an easterly direction and feeds into the River Dee approximately 30km south east. A tributary of the Clywedog is also located adjacent east of the site. According to the FEH Web Service the southern land parcel (south of the A525), in the centre and north flows are directed in an easterly direction to a tributary of the River Gwenfro. In the south flows are directed in a southerly direction directly into the River Clywedog. The site is situated along the middle reach of the catchment. Eventually the river feeds into the River Dee, approximately 35km east.

8.6 The Flood Map for Planning shows the site to be located within Flood Zone 1. The Development Advice Map, available online, indicates the site is located within Zone A. The current NRW Flood Risk from Rivers and Sea mapping, available online, shows the entirety of the site is located at very low risk of flooding from fluvial and coastal flood sources. The NRW Flood Risk from Surface Water Map, available online, indicates that the site is predominantly at “very low” risk of surface water flooding. This means that each year this area has a chance of flooding of less than 0.1%.

8.7 BGS Geology of Britain mapping show approximately 170 borehole records on the southern part of the site all relating to opencast mining and unavailable for inspection. The one log available from these records (ref: SJ35SW/46) indicates that no groundwater was struck during drilling. A borehole log in the northern land parcel (ref. SJ25SE/42) was reviewed and identified a water strike at a depth of 6.00 m below ground level at the interface between the Glacial Till and the Glaciofluvial Deposits.

Mitigation Measures Adopted as Part of the Proposed Development

8.8 As part of the design process, a number of mitigation measures have been proposed to reduce the potential for impact on flood risk and hydrological environment. These measures are considered good industrial practice for this type of development and therefore have been incorporated as 'designed in' mitigation and management measures within the base scheme design as assessed within the potential impacts. Measures adopted as part of the Proposed Development would be:

- Inclusion of a Flood Consequence Assessment which details mitigation measures in line with planning policy so that the development is safe throughout its lifetime.
- Relevant permits and consents will be obtained from NRW and WCBC prior to construction, these would include land drainage consents, as required.
- Construction phase mitigation would be implemented through the oCEMP which considers ways of reducing construction activity residues and emissions as far as practicable, including spills, noise, vehicle emissions etc. during the construction phase.
- A Decommissioning Environmental Management Plan will be prepared prior to decommissioning, setting out measures to reduce the temporary storage of materials.

Assessment of Construction Effects

8.9 During the construction phase, potential impacts on hydrology and flood risk may result from activity on the floodplain. There will also be an increase in impermeable surfaces on the site, increasing the risk of surface-water flooding. Another impact effect may be the contamination of surface water run-off to be contaminated with machinery, fuel storage or heavy vehicles parked on site.

8.10 Flows from the site contribute to the upland catchments of the River Gwenfro and River Clywedog. The Proposed Development is located within upland sections of the watercourse catchments and as such have a limited ability to absorb any changes in hydrological regime from temporary construction activities. Within the study area, adjacent land to the Proposed Development comprises a mixture of rural and agricultural land and urban settlements of Coedpoeth, Southsea and Bersham. Several roads including the A483 and A525 are also located within the study area. Site users during this phase of the Proposed Development will be construction workers and any users of the public footpaths and access tracks who are assessed to be highly vulnerable.

8.11 Taking a precautionary approach in assuming surrounding waterbodies have achieved/maintained 'good' status at the time when construction begins, the surface watercourses and groundwater bodies within the study area will have been assessed with a WFD status of 'good'. The watercourses and groundwater bodies are therefore considered to be highly vulnerable in relation to WFD classification status, and moderate value in relation to the local economy.

8.12 Impacts on flood risk would arise from any temporary change in runoff over the areas affected during construction, such as construction compounds, haul road and construction accesses. However, as construction is not anticipated to result in a significant change of the amount of existing impermeable areas within the site, site run-off rates and hydrological characteristics are not expected to deviate from baseline conditions.

8.13 Overall, the sensitivity of the receptors is considered to be high and the magnitude of the impact with mitigation measures is deemed to be negligible adverse. The effect will therefore be of minor adverse significance on surface water features, groundwater, adjacent land and site users, which is not significant in EIA terms.

Assessment of Operational Effects

8.14 The Proposed Development has been subject to an FCA and a conceptual drainage strategy in order to meet the requirements of national and local planning policy and best practice.

8.15 Due to the existing elevation of the Site in comparison to the aforementioned fluvial and sea sources, the Site is located within an area with very low risk of flooding. However, the Proposed Development would increase impermeable areas within the site.

8.16 With the incorporation of a drainage strategy, to be developed in consultation with the LLFA, it has been determined flows from impermeable area from the proposed ancillary buildings will be restricted to the 1 in 1-year greenfield runoff rate for up to the 1 in 100-year plus climate change event and thus slightly reduce the risk of flooding to areas downstream. When compared to the baseline, this slight reduction in flood risk to areas downstream introduces a slight beneficial effect.

8.17 Pollutants may be present as a result of normal operations, traffic and emergency or accidental spillage. These activities could lead to an increase in turbid run-off and spillages/leaks of fuel, oil that could runoff to watercourses and infiltrate to superficial deposits and solid geology underlying the Proposed Development.

8.18 The conceptual drainage strategy includes the provision of SuDS to mitigate pollutants. Filter strips and swales are expected to provide sufficient treatment to the run-off from impermeable areas associated with solar PV arrays. The gravel bases in which ancillary buildings e.g. transformers, substations etc. is positioned upon will filter pollutants from associated impermeable areas.

8.19 Furthermore, it is expected operational procedures to prevent any increase in pollutants to the surrounding environment.

8.20 The effect will, therefore, be of minor adverse significance on watercourses, adjacent land, and site users, which is not significant in EIA terms.

Assessment of Decommissioning Effects

8.21 Predicted effects upon hydrology and hydrogeology during the decommissioning of the Proposed Development would be equivalent to those experienced during construction for the duration of the phase. As is in the construction phase, during decommissioning of the Proposed Development, there is a potential for increased flood risk from surface water as a result of higher rates of surface water runoff from temporary features placed to support the removal of the built environment. This may include compounds, haul road and accesses. There may be a temporary alteration of the existing surface water flow regimes because of the removal of the Proposed Development.

8.22 Activities associated with removal of the underground cable have the potential to impact upon the surface water drainage regime and water quality because of earthworks operations and excavation of the cable trench.

8.23 Potential environmental impacts during the decommissioning phase will be managed through implementation of management measures to be specified ahead of the decommissioning phase commencing. Temporary drainage measures would be put in place where required and the temporary storage of materials will be reduced as far as practicable. Following decommissioning, the approach taken to construction allows the future quality of the agricultural land to be maintained with no lasting adverse effects on the quality of the soil. Water across the site will flow as is in the baseline hydrological conditions. Therefore, there will be no impact to flood risk, water resources or water quality. The site will be returned to the existing baseline hydrological conditions.

8.24 Overall, the decommissioning of the Proposed Development is not anticipated to cause any significant effects upon hydrology and hydrogeology.

Assessment of Cumulative Effects

8.25 It is assumed, where relevant, in accordance with the national and local design policy, that new developments would be required to attenuate surface water run-off, where practicable, to the greenfield run-off rate and provide appropriate management techniques to treat potentially contaminated run-off prior to discharge into the local drainage network or surrounding surface water environment. For consent to be obtained for any of the other proposed developments, the developer is required to demonstrate that the risk of flooding during the lifetime of the development could be mitigated to a level acceptable to PPG and Wrexham County Borough Council. With such measures in place, cumulative effects on water resources and hydrology with other proposed developments are not predicted to be significant. Therefore, it has been determined that no significant cumulative construction effects on water resources and hydrology receptors are likely.

8.26 In terms of operation, the cumulative developments identified would be subject to local and national policy. Under these policies, the developments would be required to demonstrate that the operational phase has a limited effect on water quality and would not increase flood risk to the site or the surrounding area. Without this, the above developments would not obtain planning permission and therefore never be in operation. The developments would therefore have a series of operational mitigation and management measures which would limit any adverse cumulative effects. This would therefore result in a residual effect of the operational phase which is classified as not significant.

Inter-relationships

8.27 The assessment includes the consideration of all potential impacts on hydrology and flood risk features, character, and water quality. This chapter also assesses hydrogeology. This topic has inter-relationships with Chapter 5: Landscape and Visual Impact and Chapter 6: Biodiversity. In particular, the landscape strategy has been designed in accordance with the drainage principles proposed for the site. No additional inter-related effects are considered likely to occur beyond those identified in these assessments.

Summary of Effects

8.28 An FCA and Conceptual Sustainable Drainage Strategy has been prepared which has assessed the Site to have a very low risk of flooding from fluvial and sea sources, a low risk of flooding from surface water and a very low to negligible risk of flooding from all other sources. The Proposed Development is defined as ‘Less Vulnerable’ according to the TAN15.

8.29 The FCA and Conceptual Drainage Strategy demonstrate that appropriate mitigation measures, a suitable drainage strategy / network, would be incorporated into the design to reduce the adverse impacts and attenuate any increase in surface water runoff. The FCA demonstrates that the Proposed Development meets the requirements of local and national policy.

8.30 The construction/decommissioning is likely to result in a temporary change to the runoff only, with an impact on local receptors. Construction measures are implemented to reduce any observable degradation to flood risk.

8.31 Although construction/decommissioning has the potential to cause a degradation of water quality to watercourses and groundwater through an increase in soil erosion and accidental release of sediment, appropriate mitigation measures have been identified within this chapter to reduce potential impacts as far as practicable. The effects are not considered to be significant.

8.32 The operation of the Proposed Development requires routine maintenance of key elements. Maintenance may involve the use of chemicals, oils, and greases and, there is the potential for spillages to occur which may affect the water quality of surrounding. Operational practices would involve management plans under appropriate Environmental Permits including spill procedures and clean up and remediation of contaminated water runoff in order to mitigate against any decrease in water quality status or damage to significant habitats. The effects of operation and maintenance on surrounding watercourses and groundwater bodies are not considered to be significant.

9 CLIMATE CHANGE

Assessment Methodology

9.1 The likely significant effects of greenhouse gas (GHG) emissions due to the Proposed Development, resulting in an effect on the global atmospheric GHG concentration that contributes to climate change, have been assessed and reported in Chapter 9. The vulnerability of the Proposed Development to a changing climate has also been assessed and reported.

9.2 GHG emissions have been estimated by applying published emissions factors to activities in the baseline and to those required for the Proposed Development. The emissions factors relate to a given level of activity, or amount of fuel, energy or materials used, to the mass of GHGs released as a consequence. The assessment has considered (a) the GHG emissions arising from the Proposed Development, (b) any GHG emissions that it displaces or avoids, compared to the current or future baseline, and hence (c) the net impact on climate change due to these changes in GHG emissions overall.

9.3 A high-level screening risk assessment has been undertaken, considering the hazard, potential severity of impact on the Proposed Development and its users, probability of that impact, and level of influence the Proposed Development design can have on the risk. Where potentially significant risks have been identified at the screening stage, further assessment has been undertaken with consideration of mitigation to determine whether significant residual risks are likely.

9.4 GHG emissions have a global effect rather than directly affecting any specific local receptor. The impact of GHG emissions occurring due to the Proposed Development on the global atmospheric concentration of the relevant GHGs, expressed in CO_2-equivalents (CO_2e), is therefore considered within this assessment. The climate change risk study area is the climate projections 25 km grid cell in which the site is located.

Baseline Environment

9.5 With regard to current climate, the baseline is the local and regional climate and resulting weather patterns recorded in Met Office data. This is in the context, however, of wider trends in global climate changes affecting the UK climate, which at present rates may be considered part of the baseline.

9.6 With regard to GHG emissions, the current baseline is agricultural land with previous industrial use. The site contains sand and gravel deposits, with shallow coal resources underlying most of the site. There is no indication of peat soils being present. With regard to the electricity export of the Proposed Development, the baseline is the current average grid electricity carbon intensity.

Mitigation Measures Adopted as Part of the Proposed Development

9.7 As a renewable energy development, climate change mitigation is an inherent aim of the Proposed Development. The primary purpose of the Proposed Development is to facilitate the generation, storage and deployment of greater amounts of renewable energy capacity, bridging the gap between fluctuations in supply and demand, and minimising reliance on high carbon intensity power generation.

Assessment of Construction Effects

9.8 The construction-stage effects due to the extraction of raw materials, manufacturing and transportation of the panels and associated electrical components have been assessed. The GHG impacts were calculated to be approximately 63,811 to 112,490 tCO_2e, resulting in a minor adverse

effect that is not significant in EIA terms. These impacts are immediate at the time of construction. The range in impacts reported accounts for the likely battery storage options to be taken forward within the final Proposed Development design.

9.9 The construction-stage GHG effects can be reduced via engagement with the supply chain and procurement decisions that consider GHG emissions performance as documented through Environmental Product Declarations, in order to ensure that the solar panel modules and associated components selected are those manufactured under conditions with reduced GHG impacts.

Assessment of Operational Effects

9.10 The operational phase GHG effects, due to the generation of zero-carbon electricity and consequent displacement of marginal sources of generation with greater GHG impacts have been assessed; they are expected to be in the order of magnitude of -83,100 to -988,234 tCO_2e over the Proposed Development's lifetime compared to a current business-as-usual baseline and projected future energy baseline across the development's 40-year operational lifespan.

9.11 Of the seven potential risks to the Proposed Development as a result of climate change, three were considered to have a potential impact in the initial screening risk assessment, being, structural damage to panel surfaces and mounting structures from extreme weather events, extreme high temperatures leading to battery efficiency losses, and shrinking and swelling of soils due to excessive rainfall and drought leading to subsidence. Owing to the good practice design measures that will be incorporated into the Proposed Development, this effect was assessed to be negligible and not significant.

9.12 The operational GHG effect of the Proposed Development has been determined to have a significant beneficial effect which is significant in EIA terms.

Assessment of Decommissioning Effects

9.13 Due to the likely short decommissioning programme variations in climatic parameters would be minimal compared to the present-day baseline. It is unlikely that there would be any significant climate change risks compared to the present-day baseline to occur during this phase. Decommissioning work practices are adapted to existing climate conditions and weather in the UK. Potential changes in climatic parameters further into the future are likely to occur gradually, and it is considered that contractors will be able to adapt working methods over time if necessary. For example, a greater change of summer heatwave conditions may require adaptations, such as shading work areas or increased attention to decommissioning dust control measures.

9.14 Emissions during the decommissioning phase likely relate to the use of plant for the decommissioning, disassembly, transportation to a waste site, and ultimate disposal or recycling of the equipment and other site materials. The majority of components of the Proposed Development are considered to be recyclable. This is the preferred solution when disposing of components, as this not only prevents the materials from being sent to landfills, but also reduces the need for the extraction of primary materials. Material which cannot be recycled might be used for incineration or energy from waste.

9.15 Given the lifetime of the Proposed Development, it is likely that material recycling will be advanced in comparison to today, and decarbonisation targets will reduce any emissions associated with plant and vehicle movements. As such, emissions associated with the disposal of materials at the end of their lifetime is considered immaterial and may even result in future avoided emissions. Associated emissions have not been considered further. Overall, it is likely that there will be no significant effect associated with the decommissioning phase of the Proposed Development.

Inter-relationships

9.16 The assessment of inter-related effects with climate change is provided in each topic chapter of this EIA Report. The main areas where there is a potential for inter-related effects are:

- Landscape and Visual – consideration of climate resilience (e.g. drought tolerance) in the design and species mix of landscape planting proposed;
- Ecology and Nature Conservation – potential changes in the sensitivity of habitats or species to development impacts in the future due to the effects of climate change; and
- Hydrology and Flood Risk – changes in rainfall frequency and intensity.

9.17 No further inter-related effects are considered likely to be significant.

Summary of Effects

9.18 Regarding the solar element of the Proposed Development, consistent with the assessment of operational effects, the lifetime effects assessment is made on the basis that the Proposed Development would displace higher emitting energy sources that would have continued in the business-as-usual baseline. This has been calculated using current grid average carbon intensity of generation, in addition to the residual energy mix carbon intensity, treating both as remaining consistent in the future baseline without the Proposed Development.

9.19 With regard to BESS, consistent with the assessment of operational effects, this assessment assumes the Proposed Development would displace high-emission energy associated with gas-fired peaking plants and replace it with energy sourced from renewable technology. Two BESS options are considered, accounting for the range in proposed storage capacity.

9.20 Together, these scenarios provide an indicative range of net GHG effects using the baseline based on the current grid average and projected long run marginal carbon intensity.

9.21 The whole-life GHG emissions (total construction- and operational-stage emissions) resulting from the Proposed Development are estimated to lie between -906,612 tCO2e and 24,641 tCO2e. This range accounts for the scenarios described in the assessment of operational effects (including the proposed range in BESS capacity), and the sensitivity analysis as described above.

9.22 Notwithstanding the GHG emissions resulting from the construction stage of the development, the magnitude of avoided emissions resulting from the operational stage of the development allows the Proposed Development to achieve net reduced emissions from its 3rd year of operation (carbon payback period) at the earliest.

9.23 Should the Proposed Development proceed with the solar element only (i.e. excluding the BESS installation), embodied carbon resulting from the development will be greatly reduced, operational avoided emissions will be slightly reduced, and an earlier carbon payback period will likely be achieved. The significance of effect would be consistent with what has been concluded within this Climate Change Chapter.

9.24 It is important to highlight that such energy infrastructure is required to achieve such grid decarbonisation. The Proposed Development would provide an immediate contribution to the UK's ambition to increase solar generation capacity fivefold as set out in the Energy Security Strategy and increase flexibility of the grid through greater storage capacity.

10 SOILS

Baseline

10.1 This Site has been identified as Agricultural Land Classification subgrade 3b. None of the Site is of the best and most versatile agricultural quality.

Mitigation Measures Adopted as Part of the Proposed Development

10.2 The site was selected to avoid areas of Best and Most Versatile (BMV) land. An area of 1.6 ha was identified from field survey to be subgrade 3a "good" quality land. This involved a small strip of land bordering the northern boundary of the Site. The design of the Proposed Development was amended to exclude this area.

10.3 The effect on BMV has been minimised by design, with BMV excluded from the Proposed Development. In addition, an outline Soil Resources Management Plan (oSRMP) has been produced to ensure that soils and land quality will be managed carefully during construction, operation and decommissioning of the Proposed Development and this is located within **Appendix 10.1** of this application.

Assessment of Construction Effects:

10.4 The effects of construction will be limited to those areas disturbed to create tracks and substation bases, and in due course the BESS. The installation of the solar PV arrays does not adversely affect soils or land quality, and is a negligible effect. The temporary effects from creating tracks and substation bases will result in the temporary sealing of less than 5ha of Subgrade 3b, which is a low magnitude effect on a resource of medium sensitivity, which is a minor significance effect.

10.5 The permanent loss of less than 1 ha of Subgrade 3b land associated with the BESS will also be a low magnitude effect on a resource of medium sensitivity, which is a minor effect (not significant).

Assessment of Operational Effects:

10.6 The operational effects will be negligible. There will be no additional effect on soils or land quality.

Assessment of Decommissioning Effects:

10.7 The decommissioning will not adversely affect soils and land quality. Therefore the magnitude of effect is negligible, and the significance of effect is negligible, which is not significant.

Assessment of Cumulative Effects

10.1 There are no cumulative effects with other proposals as they will not be affected by the Proposed Development.

Inter-relationships

10.2 The conversion of some arable land to grassland, and the reductions in the intensity of grazing, will have benefits for soil heath and soil biodiversity. This will be a minor benefit, which is not significant. It will be a benefit limited to the soils, and so there is no inter-relationship benefit with other chapters.

Summary:

10.3 The installation process involves only small areas of land for tracks and transformer bases to be disturbed. Soil that is excavated for these areas will be stored so that the same soil can be used for the restoration of these areas at the decommissioning phase. Adherence to good practice and

timing outlined within a soils management plan and will mean that the effects on land and soil are only minor or negligible and are not significant.

Figure 1.1 Site Location Plan



© 2021 RPS Group

Notes

1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.
2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.
3. © Crown copyright and database rights 2021Ordnance Survey 0100031673

Rev	Description	By	CB	Date

MAKING COMPLEX EASY

2 Callaghan Square, Cardiff, CF10 5AZ
T: 02920 668 662 **E:** rpsca@rpsgroup.com

Client Lightsource bp

Project Plas Power Solar and Energy Storage Project

Title Site Location Plan

Status	Drawn By	PM/Checked by
Planning	EA	AL

Job Ref	Scale @ A0	Date Created
JPW1473	1:5000	FEB 2024

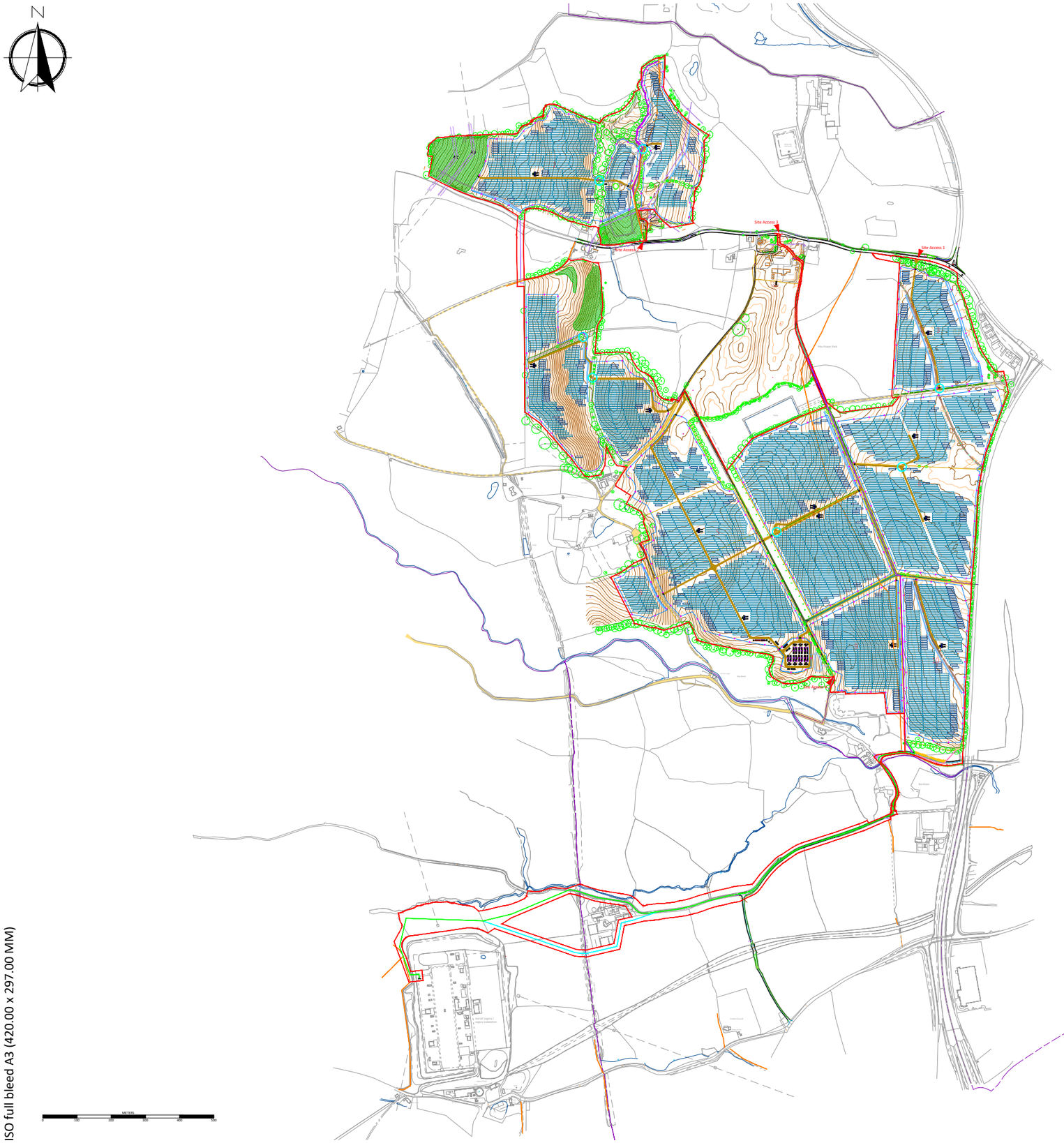
RPS Drawing/Figure Number	Rev
JPW1473-DNS-007	A

rpsgroup.com

Figure 2.1a Indicative Site Layout Plan Solar and Battery

GBR_Plas Power Solar & Battery Project_LP2 - Indicative Site layout_15

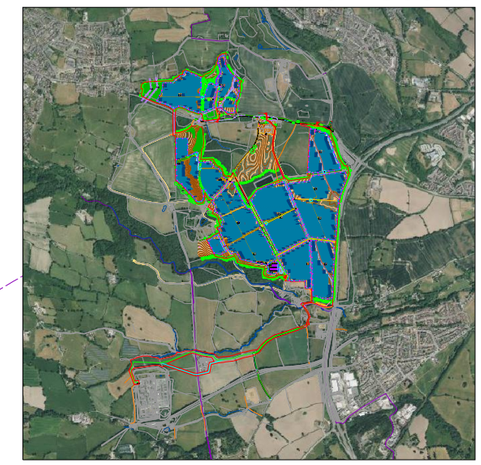
Area 1,355,959 m2 (335.06 acres)



- Site Boundary
- Site Access
- Security Fence
- Module Table 30 x 2
- Module Table 15 x 2
- Transformer
- Inverter
- Switchgear Substation
- PV Intake Substation
- GRP
- Customer Substation
- Monitoring House
- Auxiliary Transformer
- Spares Container
- Access Road
- Access Gates
- CCTV
- Toilet
- BESS Enclosure x 4
- BIC
- Twin MV Skid
- Backup Generator
- BESS Intake Substation
- Spares Container
- BESS Security Fence
- Landscape / Biodiversity
- Preferred Cable Route Option
- Cable Route Option 1
- Cable Route Option 2
- Cable Route Option 3
- Cable Route
- Existing PRoW
- Proposed PRoW diversion
- Possible hedge removal
- Indicative Swales
- Attenuation Pond
- Existing Access Road
- Existing Tree
- Existing Hedgerow/Vegetation
- Existing Ditch
- Cable Sealing End

Reproduced from Ordnance Survey digital map data © Crown copyright 2023. All rights reserved. Licence number 0100031673

Scale 1:50000



DA			22.05.2024
DRAWN	CHECKED	APPROVED	DATE

PROJECT NAME & ADDRESS:
Location: Plas Power Estate, Rhosrobin
Postcode: Caego, Wrexham, Wales

NOTES:
-
-
-
-

Paper Size:	Scale:	Sheet:
A3	1:12500	1

CAPACITY:

DRAWING TITLE:
GBR_Plas Power Solar & Battery Project_LP2 - Indicative Site Layout_15

DRAWING NUMBER:	STATUS:
LP2-PDL	

lightsource bp
bp
Lightsource Renewable Development Limited,
7th Floor, 33 Holborn, London, EC1N 2HU
General: +44 (0) 333 200 0755
Web: www.lightsourcebp.com
info@lightsourcebp.com

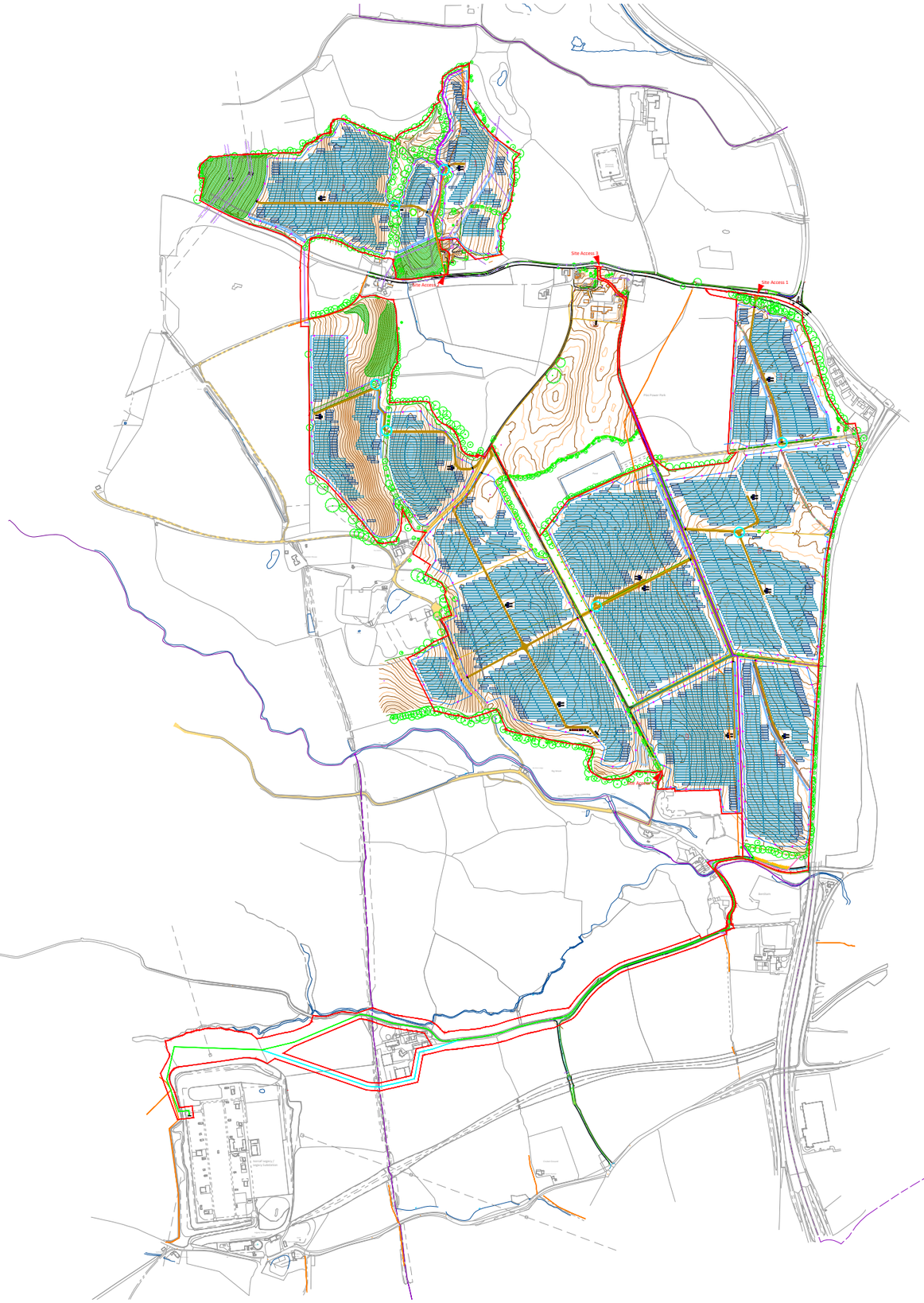
THIS DOCUMENT IS THE PROPERTY OF LIGHTSOURCE RENEWABLE DEVELOPMENT Ltd
IT IS PROHIBITED TO REPRODUCE IT FOR OTHER PURPOSES WITHOUT AUTHORIZATION IN WRITING

ISO full bleed A3 (420.00 x 297.00 MM)

Figure 2.1b Alternative Indicative Site Layout Plan (Solar)

GBR_Plas Power Solar & Battery Project_LP2 - Indicative Site layout_15

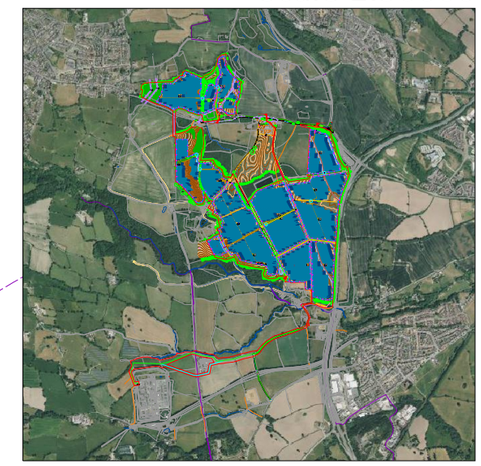
Area 1,355,959 m2 (335.06 acres)



- Site Boundary
- Site Access
- Security Fence
- Module Table 30 x 2
- Module Table 15 x 2
- Transformer
- Inverter
- Switchgear Substation
- PV Intake Substation
- GRP
- Customer Substation
- Monitoring House
- Auxiliary Transformer
- Spares Container
- Access Road
- Access Gates
- CCTV
- Toilet
- BESS Enclosure x 4
- BIC
- Twin MV Skid
- Backup Generator
- BESS Intake Substation
- Spares Container
- BESS Security Fence
- Landscape / Biodiversity
- Preferred Cable Route Option
- Cable Route Option 1
- Cable Route Option 2
- Cable Route Option 3
- Cable Route
- Existing PRoW
- Proposed PRoW diversion
- Possible hedge removal
- Indicative Swales
- Attenuation Pond
- Existing Access Road
- Existing Tree
- Existing Hedgerow/Vegetation
- Existing Ditch
- Cable Sealing End

Reproduced from Ordnance Survey digital map data © Crown copyright 2023. All rights reserved. Licence number 0100031673

Scale 1:50000



DA			22.05.2024
DRAWN	CHECKED	APPROVED	DATE

PROJECT NAME & ADDRESS:
Location: Plas Power Estate, Rhosrobin
Postcode: Caego, Wrexham, Wales

NOTES:
-
-
-
-

Paper Size:	Scale:	Sheet:
A3	1:12500	1

CAPACITY:

DRAWING TITLE:
GBR_Plas Power Solar & Battery Project_LP2 - Indicative Site Layout_15

DRAWING NUMBER:	STATUS:
LP2-PDL-S	Pre-application Consultation

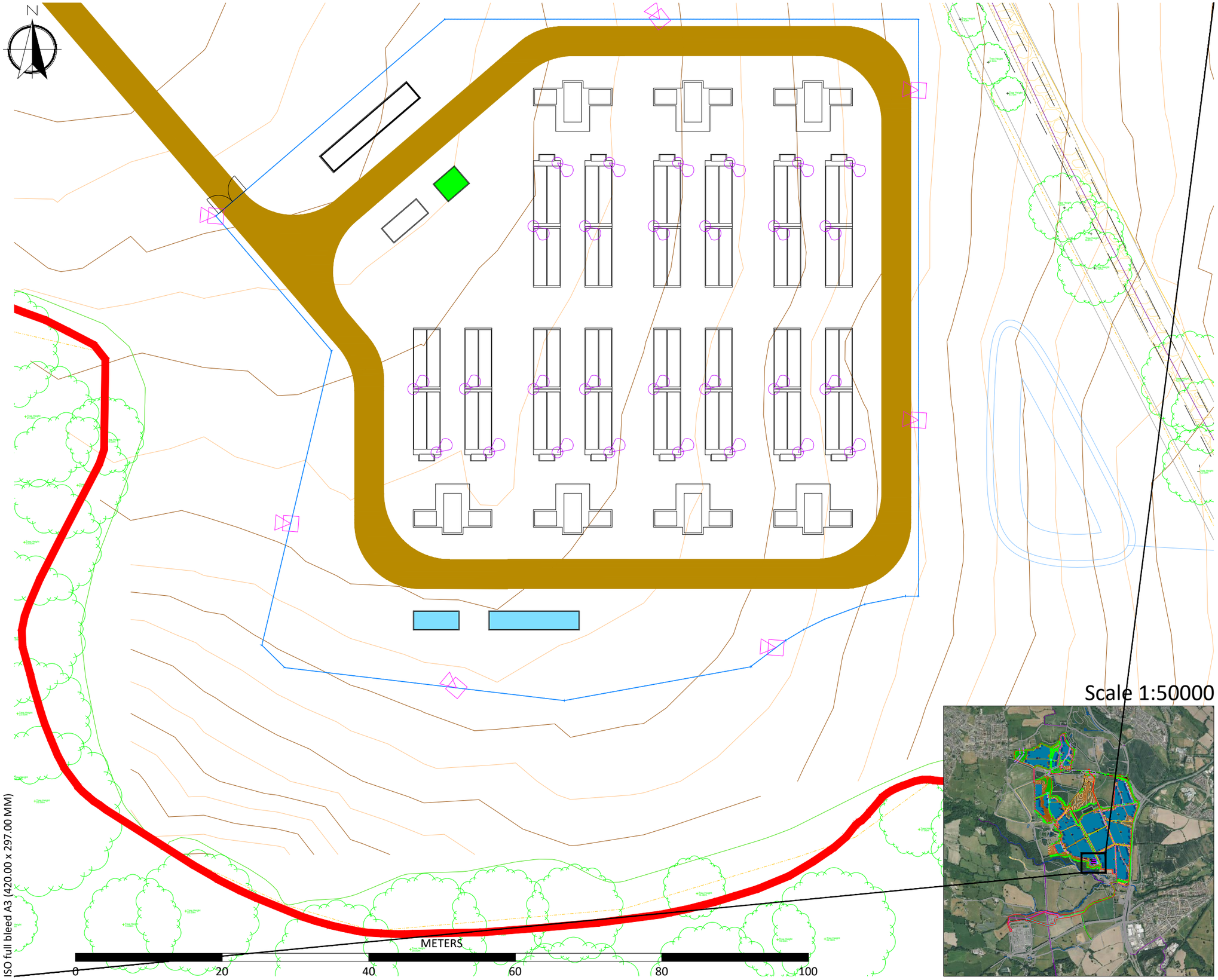
lightsource bp
bp
Lightsource Renewable Development Limited,
7th Floor, 33 Holborn, London, EC1N 2HU
General: +44 (0) 333 200 0755
Web: www.lightsourcebp.com
info@lightsourcebp.com

THIS DOCUMENT IS THE PROPERTY OF LIGHTSOURCE RENEWABLE DEVELOPMENT Ltd
IT IS PROHIBITED TO REPRODUCE IT FOR OTHER PURPOSES WITHOUT AUTHORIZATION IN WRITING

ISO full bleed A3 (420.00 x 297.00 MM)

Figure 2.2 Indicative BESS Layout

GBR_Plas Power Solar & Battery Project_Indicative BESS Layout_01



ISO full bleed A3 (420.00 x 297.00 MM)

Reproduced from Ordnance Survey digital map data © Crown copyright 2023. All rights reserved. Licence number 0100031673

DRAWN	CHECKED	APPROVED	DATE
DA			31.01.2024

PROJECT NAME & ADDRESS:
Location: Plas Power Estate, Rhosrobin
Postcode: Caego, Wrexham, Wales

NOTES:
-
-
-
-

Paper Size:	Scale:	Sheet:
A3	1:500	1

CAPACITY:

DRAWING TITLE:
GBR_Plas Power Solar & Battery Project_Indicative BESS Layout_01

DRAWING NUMBER:	STATUS:
BESS_LYT	Pre-application Consultation

lightsource bp
bp
Lightsource Renewable Development Limited,
7th Floor, 33 Holborn, London, EC1N 2HU
General: +44 (0) 333 200 0755
Web: www.lightsourcebp.com
info@lightsourcebp.com

THIS DOCUMENT IS THE PROPERTY OF LIGHTSOURCE RENEWABLE DEVELOPMENT Ltd
IT IS PROHIBITED TO REPRODUCE IT FOR OTHER PURPOSES WITHOUT AUTHORIZATION IN WRITING

Figure 2.3 Illustrative Landscape and Ecology Masterplan

© 2021 RPS Group

Notes

1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.
2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.
3. Where applicable Ordnance Survey (c) Crown Copyright 2021
All rights reserved. Licence number 0100031673



Biodiversity Area 1 – Undisturbed Nature Area - Scale 1:1000



Landscape and Biodiversity Area 2 – Open Space and Amenity Area - Scale 1:1000

Key

Proposed elements

- APPLICATION SITE BOUNDARY
- SITE ACCESS
- MODULE PANELS (See Layout for further details)
- SECURITY FENCE TBC
- PROPOSED ACCESS TRACK
- STRUCTURES (See Layout for further details)
- A — FIELD REFERENCE For LVIA and G&G

SOFT LANDSCAPE

Proposed elements

- DECIDUOUS TREE Varied native species and stock sizes
- CONIFEROUS TREE Varied native species
- SPECIMEN SHRUB In shrub border or gravel area
- NATIVE HEDGEROW (WITH SPACED STANDARD TREES) Complementing existing hedge lines and providing new field boundaries
- NATIVE CLIPPED HEDGEROW Complementing existing hedge lines and providing new field boundaries
- STRUCTURAL WOODLAND AND SHRUB Varied structure native woodland planting
- WOODLAND EDGE SHRUB Varied structure native shrub planting
- GRAZING GRASSLAND
- FIELD MARGIN MEADOW
- TUSSOCKY GRASSLAND
- WOODLAND MEADOW
- WILDFLOWER MEADOW
- WETLAND MEADOW
- MOWN AMENITY GRASS
- SPRING FLOWERING BULB PLANTING

HARD LANDSCAPE

Proposed elements

- INTERPRETATION BOARD Varied information, refer to notes for details
- FOOTPATH Compacted gravel

BIODIVERSITY ENHANCEMENTS

- WILD BIRD SEED CROP 6m wide on southern side of hedgerows
- ECOLOGICAL ENHANCEMENTS As per ecological reports
- ECOLOGICAL ENHANCEMENT AREA See inserts for details

Existing features

- TREES To be retained and protected. New tree planting would complement existing species and provide ongoing variation and structure.
- WOODLAND To be retained, protected and managed appropriately for longevity
- HEDGEROW / SCRUB To be retained, protected and gapped up where appropriate and managed on rotational basis to a height of 2.5-3m
- PUBLIC RIGHTS OF WAY Maintained and opportunities to further connect (As traced from OS Explorer 1:25,000)
- ANCIENT WOODLAND CLASSIFICATION Ref to Arb reports for further detail
- WATERBODY To be retained, protected and enhanced as possible and recommended within ecological reports
- GRAVEL TRACK Existing gravel track to be retained

Note

The illustrated landscape treatment would not alter if the proposed development included PVs instead of the BESS

Field D has been removed from the development

N

Rev	Description	By	CB	Date
G	REVISED LAYOUT	JN	CL	05.24
F	REVISED LAYOUT	JN	CL	05.24
E	Additional screening to Biodiversity Area 1 and Field T	PL	CL	05.24
D	REVISED LAYOUT	PL	GL	01.24
C	REVISED LAYOUT	CL	KH	11.23
B	OPEN SPACE AMENITY AREA	CL	KH	10.23
A	REVISED LAYOUT 2023	CL	KH	09.23

RPS MAKING COMPLEX EASY
A TETRA TECH COMPANY

Lakesbury House, Hiltingbury Road, Chandlers Ford, Hampshire SO53 5SS

T: 02380 810 440 **E:** rpsso@rpsgroup.com

Client: Lightsource bp

Project: Plas Power Solar and Energy Storage Project

Title: Illustrative Landscape and Ecology Masterplan

Status	Drawn By	PM/Checked by
Final	KH	GL

Job Ref	Scale @ A0	Date Created
JSL3436	See Scale Bar	Feb 2024

RPS Drawing / Figure Number: Figure 5.10

Rev: G

rpsgroup.com

P:\3400 Series\JSL3436 - Plas Power Estate (Prime WWP-JPW1473)\Tech\ACAD\Current\JSL3436_Fig 5.10_100G Landscape Masterplan1.dwg

Xref .\XREF\GBR_Plas Power_LP2-PDL-PV-BESS_15-PL.dwg