Glöyn Byw | Butterfly Solar Farm

ES Chapter 9.0 – Mitigation Schedule and Summary of Residual Effects

Prepared for

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CONTENTS

TABLES

9.0 MITIGATION SCHEDULE AND SUMMARY OF RESIDUAL EFFECTS

9.1 Mitigation Schedule

Overview

9.1.1 Table 9.1 below provides a summary overview of

- The proposed mitigation measures included in the design of the Proposed Development (initial development design and impact avoidance/reduction measures). These measures are referenced in Table 9.1 as 'M1'.
- The proposed further mitigation and monitoring measures following the initial assessment (which have subsequently informed the residual effects section in ES Chapters 5.0 – 8.0 (topic chapters). These measures are referenced in Table 9.1 as 'M2'.

9.1.2 The approach to the identification of mitigation measures is introduced in ES Chapter 2.0 (EIA Methodology) and described in further detail in ES Chapter 4.0 (Description of the Proposed Development) and ES Chapters 5.0 – 8.0 (topic chapters).

9.1.3 Proposed enhancements are summarised in the paragraphs beneath Table 9.2.

Mitigation Classification

9.1.4 The classification of mitigation is summarised below and set out in more detail at Section 2.5 of ES Chapter 2.0 (EIA Methodology).

9.1.5 The IEMA Impact Assessment Guidelines document 'Implementing the Mitigation Hierarchy from Concept to Construction (2024)' states that *"classifying mitigation measures into one of three key types helps to achieve a more proportionate ES, as it allows for some mitigation measures to be taken-as-read in assessing effects (i.e. these mitigations are embedded intrinsically into the project design as set out in the project description."* There are three distinct forms of mitigation as follows:

- **Primary (inherent)** - An inherent part of the project design and should be described in the design evolution narrative and included in the project description.

- **Secondary (foreseeable)** - Requires further activity to achieve the anticipated outcome – typically, these will be described in the ES chapters but often secured through planning conditions, requirements, and/or management plans.
- **Tertiary (inexorable)** - Required regardless of any EIA assessment as it is imposed, for example, because of legislative requirements and/or standard sectoral practices.

9.2 Summary of Residual Effects

Overview

9.2.1 ES Chapters 5.0 – 8.0 (topic chapters) have considered the potential environmental impacts and effects of the Proposed Development. Table 9.2 below provides a summary of the likely environmental effects of the Proposed Development that have been identified, following the assumed implementation of the proposed 'initial development design and impact avoidance/reduction measures' (which are summarised in Table 9.1).

9.2.2 Table 9.2 also provides a summary of the residual effects following the assumed additional implementation of the proposed 'further mitigation and monitoring measures' (also summarised in Table 9.1).

Nature of Effect

9.2.3 To provide further clarity on the nature of the effects described in Table 12.2, each has been identified for the purposes of this summary as follows:

- **Short term (St)** – Effects occurring only over a short period of time. As the Proposed Development is designed (and assessed) to be permanent, medium-term effects (occurring for the duration of the Proposed Development's operation) and long-term effects (occurring beyond the operation of the Proposed Development) are deemed to be covered under 'permanent' effects (see below).
- **Temporary (T)** – Effects that are not permanent because the effect would no longer occur if the impact was removed within the relevant timescale.
- **Permanent (P)** – Effects that remain and cannot be readily reversed within the relevant timescale.
- **Direct (D)** – Effects that result from a direct impact.

- **Indirect (In)** – Also known as secondary effects, effects that result indirectly.

Table 9.1 – Summary of Mitigation Measures

Development Stage	Initial Development Design and Impact Avoidance / Reduction Measures (M1)	(M1) Mitigation Classification	Further Mitigation and Monitoring (M2)	(M2) Mitigation Classification
Measures relevant to all topics				
Construction	Outline Construction Environmental Management Plan	Primary and Secondary (the detailed CEMP adopted by the Principal Contractor for implementation during construction is classed as Secondary mitigation)	N/A	N/A
Decommissioning	Decommissioning Environmental Management Plan	Secondary	N/A	N/A
ES Chapter 5.0 – Ecology				
Construction and Decommissioning	The protection and retention of identified higher value boundary habitats (such as watercourses, hedgerows, tree lines and woodland) and any associated non-statutory designated site designations, focusing the built development within lower ecological value agricultural land.	Primary	N/A	N/A
	The provision of buffers between development areas and potentially sensitive features have been included to avoid and minimise effects on ancient woodland, watercourses and boundary trees and hedgerows.	Primary	N/A	N/A
	Habitat creation (grassland / meadow creation, hedgerow and tree planting and creation of woodland copse), which will	Primary	N/A	N/A

Development Stage	Initial Development Design and Impact Avoidance / Reduction Measures (M1)	(M1) Mitigation Classification	Further Mitigation and Monitoring (M2)	(M2) Mitigation Classification
	diversify and strengthen the biodiversity interest of Site and neighbouring area, whilst achieving net biodiversity benefit.			
	Best practice avoidance and mitigation measures in relation to avoiding impacts to bats, great crested newts and watercourses.	Tertiary	N/A	N/A
Operation	Implementation of a project-specific Landscape and Ecology Management Plan.	Secondary	N/A	N/A
ES Chapter 6.0 – Landscape and Visual Impact				
Construction and Decommissioning	Containment of the Proposed Development within established field boundaries to retain the existing landscape pattern.	Primary	N/A	N/A
	Provision of development-free buffers alongside existing landscape features, including hedgerow, trees and public rights of way and retention of existing vegetation cover (which defines character and provides visual screening), as far as possible.	Primary	N/A	N/A
	New planting of mixed native hedgerow and tree species of local provenance to infill gaps in hedgerows, where consistent with landscape character in the Study Area and where it provides further screening.	Primary	Additional planting and enhancement of exiting hedgerow to be provided to provide further screening to residents at Plas Eyton north of the B5426.	Secondary
	New tree and hedgerow planting.	Primary	Add additional hedgerow planting along a section of public footpath SES/9, running along part of the southern boundary of the EAA.	Secondary

Development Stage	Initial Development Design and Impact Avoidance / Reduction Measures (M1)	(M1) Mitigation Classification	Further Mitigation and Monitoring (M2)	(M2) Mitigation Classification
	Muted mid-tone neutral paint finish to the main structural elements of the proposed substation to ensure that they are visually recessive within the landscape.	Primary	N/A	N/A
	Use of anti-reflective material on solar PV modules to limit glint and glare effects.	Primary	N/A	N/A
Operation	Management and enhancement of existing vegetation cover that defines character and provides visual screening.	Secondary	N/A	N/A
	Implementation of a project-specific Landscape and Ecology Management Plan.	Secondary	N/A	N/A
ES Chapter 7.0 – Historic Environment				
Construction and Decommissioning	Avoidance of the Proposed Development encroaching on areas of Ancient Woodland.	Primary	N/A	N/A
	New tree and hedgerow planting.	Primary	Increase in hedgerow heights and planting along existing hedgerow boundaries in the west of the Central Array Area would serve to limit views of Proposed Development infrastructure within land historically connected to the Listed Buildings at The Groves.	Secondary
	Desk based assessment (archaeological remains) and geophysical survey.	Primary	Targeted trial trench evaluation. If significant below ground features are identified through the trial trench evaluation, they are to be preserved in	Secondary

Development Stage	Initial Development Design and Impact Avoidance / Reduction Measures (M1)	(M1) Mitigation Classification	Further Mitigation and Monitoring (M2)	(M2) Mitigation Classification
			situ through the application of a 'no-dig' design solution. Where remains are identified but not required to be preserved in situ, such remains would be preserved by record.	
	Archaeological watching brief to be carried out during ground-breaking works along the proposed cable route where the cable route crosses the paths of Wat's Dyke (Asset 694) and Offa's Dyke (Asset 536).	Tertiary	N/A	N/A
ES Chapter 8.0 – Noise and Vibration				
Construction and Decommissioning	Restriction of construction hours to non-sensitive times of day would normally form part of the planning consent conditions. The construction delivery hours proposed would be generally limited to 07.30 to 18.00hrs Monday to Friday and 08.00 to 14.00hrs Saturday. No work on Sundays or Bank Holidays are proposed.	Primary	N/A	N/A
	Sound power levels of plant as detailed in **Table 5.5 of ES Chapter 5.0 Noise**.	Primary	N/A	N/A
	Use of relatively low impact construction techniques (micro-piling).	Primary	N/A	N/A
	Outline Construction Environmental Management Plan (OCEMP)	Primary	N/A	N/A
	Using 'silenced' plant and equipment.	Tertiary	N/A	N/A

Development Stage	Initial Development Design and Impact Avoidance / Reduction Measures (M1)	(M1) Mitigation Classification	Further Mitigation and Monitoring (M2)	(M2) Mitigation Classification
Construction and Decommissioning				
	Switching off engines where vehicles are standing for a significant period of time.	Tertiary	N/A	N/A
	Fitting of acoustic enclosures to suppress noisy equipment as appropriate	Tertiary	N/A	N/A
	Operating plant at low speeds and incorporating of automatic low speed idling.	Tertiary	N/A	N/A
	Selecting electrically driven equipment in preference to internal combustion powered, hydraulic power in preference to pneumatic and wheeled in lieu of tracked plant.	Tertiary	N/A	N/A
	Properly maintaining all plant (greased, blown silencers replaced, saws kept sharpened, teeth set and blades flat, worn bearings replaced, etc.)	Tertiary	N/A	N/A
	Considering the use of temporary screening or enclosures for static noisy plant to reduce noise emissions as appropriate.	Tertiary	N/A	N/A
	Certifying plant to meet any relevant EC Directive standards.	Tertiary	N/A	N/A
	Undertaking awareness training of all contractors in regards to BS 5228 (Parts 1 and 2) which would form a prerequisite of their appointment.	Tertiary	N/A	N/A

Development Stage	Initial Development Design and Impact Avoidance / Reduction Measures (M1)	(M1) Mitigation Classification	Further Mitigation and Monitoring (M2)	(M2) Mitigation Classification
Construction and Decommissioning	Inform local residents of the works being undertaken and provide a complaints procedure for local residents to enable them to contact the Site should any issues arise in terms of noise.	Tertiary	N/A	N/A
	Noise monitoring would be carried out during particularly noisy phases of work and when work is undertaken in close proximity to the Site boundary so that such situations can be actively managed in accordance with the CEMP for the Site.	Tertiary	N/A	N/A
Operation	Sound power levels of plant as detailed in **Table 5.7 of ES Chapter 5.0 Noise**.	Primary	N/A	N/A
	4m high acoustic barriers to be included around all hybrid inverter containers and inverter containers in the Eastern Array Area	Primary	N/A	N/A
	Design to include control of noise character (i.e. tonality and impulsivity) in accordance with BS4142:2014+A1:2019.	Primary	N/A	N/A

Table 9.2 – Summary of Likely Residual Effects

Development Stage	Environmental Receptor	Level of Effect (following initial development design and impact avoidance / reduction measures)	Residual Level of Effect (following further mitigation and monitoring)	Nature of Effect
ES Chapter 5.0 – Ecology				
Construction	On-site habitats	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	St, T, D
	Otter, great crested newt, foraging and commuting bats, barn owl, Priority and Notable Habitats, Non-Statutory Designated Sites for Nature Conservation, Statutory Designated Sites for Nature Conservation.	Negligible (Not Significant)	Negligible (Not Significant)	St, T, D
	On-site habitats of Site importance	Minor adverse (Not Significant)	Minor adverse (Not Significant)	P, D
Operation	Priority habitats (hedgerows), on-site habitats and foraging and commuting bats	Minor Beneficial (Not Significant)	Minor Beneficial (Not Significant)	P, D
	Non-statutory Designated Sites for Nature Conservation	No impact	No impact	N/A
	Barn Owl	No adverse impact (potential for beneficial effect)	No adverse impact (potential for beneficial effect)	P, D
ES Chapter 6.0 – Landscape and Visual Impact				
Construction and Decommissioning	LCA13a: Welsh Maelor	Moderate/Major (adverse) (Significant)	Moderate/Major (adverse) (Significant)	St, T, D

Development Stage	Environmental Receptor	Level of Effect (following initial development design and impact avoidance / reduction measures)	Residual Level of Effect (following further mitigation and monitoring)	Nature of Effect
	Other Landscape Character Areas	Negligible to Minor Adverse (Not Significant)	Negligible to Minor Adverse (Not Significant)	
	Night-time Landscape and Visual Effects	Assessed to be Not significant	Assessed to be Not Significant	
	Effects on Views experienced by people using public footpaths, and by residents of properties in close proximity to and with views of construction activity.	Assessed to be Not significant	Assessed to be Not Significant	
Operation	Landscape Character Areas	No change to Moderate Adverse (Not Significant) (at Year 15)	No change to Moderate Adverse (Not Significant) (at Year 15)	P, D
	Visual Receptors at Selected Viewpoints- Viewpoints 1 – 9 and 12-14	No perceivable effect to Moderate/Minor Adverse (Year 15) (Not Significant)	No perceivable effect to Moderate/Minor Adverse (Year 15) (Not Significant)	P, D
	Visual Receptors - Walkers on public footpath MAR/5 running along part of the southern boundary of the CAA; Walkers on two sections of public footpath SES/6; and Visual Receptors -Walkers on public footpath SES/9, running along part of the southern boundary of the EAA	Negligible to Major Adverse (Year 15) (Significant)	Negligible to Major Adverse (Year 15) (Significant)	P, D
	All other identified visual receptors.	Negligible to Moderate Adverse (Year 15) (Not Significant)	Negligible to Moderate Adverse (Year 15) (Not Significant)	P, D

Development Stage	Environmental Receptor	Level of Effect (following initial development design and impact avoidance / reduction measures)	Residual Level of Effect (following further mitigation and monitoring)	Nature of Effect
ES Chapter 7.0 – Historic Environment				
Construction and Decommissioning	Features identified during geophysical survey: - remains of a probable oval enclosure (Asset 805) - linear features (Asset 807) - possible ring ditch (Asset 809)	Potential moderate effect on below ground features (Significant)	Minor (Not Significant)	P, D
	Features identified during geophysical survey: Assets 806 and 808	Minor (Not Significant)	Minor (Not Significant)	
	Two ridge and furrow areas (Asset 786 and 787), six ponds (792, 793, 796, 797, 800, and 803).	Minor (Not Significant)	Minor (Not Significant)	
	Sub surface remains of an Air Crash Site (Asset 626).	Potential negligible (Not significant)	Potential negligible (Not significant)	
	Scheduled Asset 35 (Section 35 of Wat's Dyke) and Asset 34 (Section 9 of Offa's Dyke)	No impact	No impact	
	Setting impacts	Negligible to Minor (Not significant)	Negligible to Minor (Not significant)	St, T, D
Operation	Archaeological Remains	No impact	No impact	N/A
	Settings of the Grade II Listed Buildings of The Groves (Asset 79)	Moderate adverse (Significant)	Minor Adverse (Not Significant)	P, D

Development Stage	Environmental Receptor	Level of Effect (following initial development design and impact avoidance / reduction measures)	Residual Level of Effect (following further mitigation and monitoring)	Nature of Effect
	and the Former House at The Groves (Asset 208).			
	Settings of other assets	Negligible to Minor Adverse (Not Significant)	Negligible to Minor Adverse (Not Significant)	P, D
ES Chapter 8.0 – Noise and Vibration				
Construction and Decommissioning	Plant noise – residential and recreational	Assessed to be Not significant	Assessed to be Not Significant	St, T, D
Operation	Plant noise - residential and recreational	Assessed to be Not significant	Assessed to be Not Significant	P, D
Cumulative Effects				
For all ES topic chapters, the cumulative effects of the Proposed Development would not materially differ from those described in the pre-cumulative assessments. Cumulative effects would not be significant and no additional mitigation measures are proposed to address cumulative effects.				

9.3 Enhancements

9.3.1 Enhancement measures are included as part of the Proposed Development and primarily relate to landscape and habitat enhancement measures. These measures are shown on the landscape plans (ES Figures 1.4a-c) for each of the three proposed solar array areas. The enhancement measures include:

i) Planting of diverse wildflower meadows within buffer zones along field boundaries to increase biodiversity and encourage pollinators to the Site;
ii) Information Boards within the Western Array Area to promote access to Bonc-Yr-Hafod Country Parc, and to promote the heritage and recreational value of Wat's Dyke;
iii) Improvements to existing ponds within the Central Array Area and Eastern Array Area, including marginal planting to attract aquatic wildlife and to increase biodiversity;
iv) New community orchard in the south-western part of the Central Array Area;
v) Creation of new permissive footpaths to link up existing routes, filling gaps in the existing network and creating loops where possible, to enhance appeal to users and to improve connectivity;
vi) Measures to enhance the site for wildlife including bird boxes, owl boxes, bat roost boxes, and hibernacula/log piles; and
vii) Information Boards within the Central Array Area and Eastern Array Area to provide information about the public routes available and the social and natural history of the Site and its surroundings.

9.4 Conclusions

9.4.1 The embedded mitigation measures described in the each of the topic chapters (ES Chapters 5.0 to 8.0) form a critical part of the Proposed Development subject to EIA.

9.4.2 The ES has assessed and evaluated all potential significant, direct, indirect, cumulative and in-combination environmental effects of the Proposed Development. Where adverse effects have been identified, measures envisaged to prevent, reduce, and if appropriate offset these effects have been described.

9.4.3 The assessments have demonstrated that the only likely long term significant effects would be effects to views experienced by persons on public footpaths which would run through and/or alongside the Proposed Development.

9.4.4 A range of mitigation and enhancement measures are proposed which would ensure any adverse environmental effects from the Proposed Development are minimised. Several of the measures proposed would result in positive environmental effects.