

6 ECOLOGY AND NATURE CONSERVATION

Introduction

- 6.1 The purpose of this chapter is to identify and assess the effects on ecology and biodiversity which would result from the Proposed Development at Maes Mawr Farm, to the east of Church Village in Rhondda Cynon Taff, South Wales.

Assessment Methodology

Planning Policy Context

- 6.2 The following national and local planning policy documents and guidance are relevant to the Proposed Development:

- Planning Policy Wales (PPW) Edition 11
- Technical Advice Note (TAN) 5 - Nature Conservation and Planning
- The Rhondda Cynon Taf Local Development Plan (RCTCBC, 2006); and
- Rhondda Cynon Taff Local Biodiversity Action Plan (Rhondda Cynon Taff Local Biodiversity Steering Group, 2000).
- Rhondda Cynon Taff Supplementary Planning Guidance - Nature Conservation (RCTBC 2011)

Relevant Guidance

- 6.3 The assessment follows the methods set out in guidance published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

- 6.4 The assessment has also been prepared in relation to the following legislation and conservation priorities:

- The Environment (Wales) Act 2016 including Section 7 (S&) Habitats and Species of Principal Importance
- Well-being of Future Generations (Wales) Act, 2015
- Wildlife and Countryside Act 1981 (as amended)
- Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019
- Countryside and Rights of Way Act 2000
- Natural Environment and Rural Communities Act (NERC) 2006
- Protection of Badgers Act 1992
- Hedgerow Regulations (1997)
- Wales and UK Birds of Conservation Concern (BoCC)

Study Area

- 6.5 The study area for the baseline habitat and species surveys was the site and the immediate surrounds.

6.6 The study area extends up to 2km from the site for non-statutory designated sites and species records, 5km for statutory designated sites and 10km for international designated sites. The study area for great crested newts (GCN) included waterbodies within 500m of the site.

Baseline Methodology

6.7 The following baseline studies and surveys have been undertaken for this assessment (appendices can be found in Volume 3 of this ES):

- Preliminary Ecological Appraisal (PEA) with habitat survey information compiled during site visits at different times of year in 2020, 2021 and 2022 (**Appendix 6.1**);
- Great crested newt survey comprising Habitat Suitability Index (HSI) assessment of on-site ponds, and environmental DNA (eDNA) survey of on-site ponds (**Appendix 6.2**);
- Water vole and otter surveys completed over three survey visits recording signs of activity (**Appendix 6.2**);
- Wintering bird survey report (**Appendix 6.3**); and

6.8 Detailed methodologies of the relevant baseline surveys are given within each of the survey reports included in each of the appendices.

6.9 A breeding bird survey is being undertaken in spring and summer 2022 and an assessment for the potential value of the site for barn owl is being undertaken in summer 2022 including a vantage point survey. The findings from these additional surveys have been used in this assessment wherever possible and will be fully reported in the submission version.

Consultation

6.10 A summary of consultations with stakeholders and consultees with respect to ecology is provided in **Table 6.1** below.

Table 6.1: Consultation Responses Relevant to this Chapter

Consultee and Issues Raised	How/ Where Addressed
Rhonda Cynon Taff Meeting	
Potential for great crested newt populations	Survey results confirmed likely absence as detailed in Appendix 6.2
SINC designations	Maintain stand offs to avoid indirect impacts during both construction and operation
Extensive marshy grassland field has been identified as a Prospective SINC because of its potential for enhancement and linkage with other SINC's	Retain part of extensive marshy grassland and include in the biodiversity enhancement to be delivered as part of the development
Wintering birds – presence of wintering farmland passerines in late winter with flocks of county importance noted	Incorporation of retained and new winter food sources for birds in the site design and landscape
Breeding birds – potential to support breeding S7 species including:	Addressed through layout, landscape proposals and long-term management
Willow warbler	Retention of all hedgerows and trees
Skylark,	Incorporation of mitigation for ground nesting birds
Tree pipit	

Consultee and Issues Raised	How/ Where Addressed
	Field boundary management to maintain extent of nesting habitat
Barn owl has been recorded close to the site in the past	Barn owl vantage point survey being undertaken in summer 2022 to assess hunting over higher value habitat
Water vole colonies have been found in terrestrial habitats (marshy grassland/flush) in upland location within RCT	Surveys have confirmed the very likely absence of water vole in the watercourses, ponds and adjoining terrestrial habitat (Appendix 6.2)
Enhancement for biodiversity required for the development proposal	Landscape masterplan includes the incorporation of ecological enhancement area set aside from the solar arrays. Management targeted at safeguarding and enhancing biodiversity will deliver this requirement following construction and over the operational life of the development
Rhonda Cynon Taff – County Ecologist Additional Comments	
Extensive marshy grassland, and the adjacent low-lying damp to the immediate south, may support some peat-based habitat Peat bogs (even very degraded bogs) are a priority habitat type	Assessment of presence/absence of peat completed in 2022 confirming localised area of deep peat beneath the extensive marshy grassland and localised areas of surface peat associated with waterlogged ground
Site includes semi-improved dry grassland pasture and marshy grassland pasture which have the potential to support indicator species	An update of the botanical survey of the modified agricultural grasslands was completed in late spring 2022
Dormouse - recent record of dormouse along railway line woodland just to the north of this site	Presumed presence of a population using the hedgerows within the site Protection of hedgerows and the connectivity of the network
Water vole - recent sighting from an experienced ecologist on a pool in rush pasture on Llantwit Fardre Marsh	The survey for water vole 2021 confirmed likely absence from the pools and adjoining grassland. Follow up survey undertaken in May 2022
Short grazed permanent pastures can support rich grassland fungi communities	Suitable habitat is being retained within the proposed development
Detailed and robust ecological mitigation and enhancement measures required due for the habitats associated with less intensive agriculture	The layout avoids most key habitats – hedgerows, ditches, streams, mature trees, woodland An extensive wetland ecological enhancement area will be provided in the northern part of the site, encompassing a small area of the S7 habitat 'purple-moor grass rush pasture' and the majority of the area of deep peat Dry (neutral/acid) grassland on the eastern boundary alongside the SINC will be excluded from grazing and will be subject to a cutting regime to encourage the abundance of indicator species. Banks and undulating ground on field margins (many with existing botanical diversity) will be retained and actively managed for biodiversity

Assessment Criteria and Assignment of Significance

- 6.11 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 the Proposed Development but do not need to be considered because there is no potential for them to be significantly affected.

Receptor Sensitivity/Value

6.12 Each IEF is ascribed a value based on several parameters as set out in 6.2.

Table 6.1: Definitions of Ecological Receptor Value

Receptor Value	Typical Descriptors
Very High	<p>Sites of International (i.e. greater than UK or Welsh) significance e.g. Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar Sites.</p> <p>Sites which have features sufficiently unique or unusual as to be considered one of the highest quality examples in an international or national context and therefore are likely to qualify as a site of European or international importance.</p> <p>Resident, or regularly occurring, populations of species which may be considered at an International or European level where:</p> <ul style="list-style-type: none"> the loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; or the population forms a critical part of a wider population at this scale; or the species is at a critical phase of its life cycle at this scale.
High	<p>Sites of UK or National (English) Importance e.g. Sites of Special Scientific Interest (SSSI) & National Nature Reserves (NNR).</p> <p>Sites which have features sufficiently unique or unusual as to be considered one of the highest quality examples nationally and therefore are likely to qualify as a site of national importance.</p> <p>Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level where:</p> <ul style="list-style-type: none"> the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or the population forms a critical part of a wider population at this scale; or the species is at a critical phase of its life cycle at this scale.
Medium	<p>Sites of Regional (Southern England) or County (Hertfordshire) Importance e.g. Sites of Nature Conservation Importance (SINCs), Local Nature Reserves (LNRs) Local Wildlife Sites (LWSs) and Ancient Woodland.</p> <p>Priority habitats in UK BAP, Habitats of Principal Importance under the NERC Act (2006) and Ancient Woodland</p> <p>Sites which have features sufficiently unique or unusual as to be considered one of the highest quality examples in the regional / county context and therefore are likely to qualify as a site of regional / county importance.</p> <p>Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level and key/priority species listed within Local BAPs where:</p> <ul style="list-style-type: none"> the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or the population forms a critical part of a wider population at this scale; or the species is at a critical phase of its life cycle at this scale.
Low	<p>Sites of District / Local Importance but unlikely to be of sufficient value to merit a formal nature conservation designation.</p> <p>Presence of Local Biodiversity Action Plan (LBAP) habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected.</p> <p>Areas of habitat; or populations / communities of species considered to appreciably enrich the habitat resource within the local context (such as veteran trees), including features of value for migration, dispersal or genetic exchange.</p>
Negligible	Includes features of site level value and of no more than Parish importance.

6.13 In assigning a value to a site, habitat or species population or assemblage, its distribution and status (including a consideration of trends based on available historical records) are considered. Rarity is considered because of its relationship with threat and vulnerability, and the need to conserve representative areas of habitats and genetic diversity of species populations, although rarity in itself is not necessarily an indicator of value. A species that is rare and declining is assigned a higher value than one that is rare but known to be stable.

Magnitude of Impact

Table 6.2: Example Definitions of Magnitude

Sensitivity	Typical Descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

6.14 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.

Significance of Effects

6.15 The assessment of significance is based on the assessment matrix shown in **Table 6.4**. Both sensitivity/value and magnitude have been taken into account in determining the significance of effect. This assessment also defines significance based on the following:

- Reference to regulations or standards;
- Reference to best practice guidance;
- Reference to policy objectives;
- Reference to criteria, for example designations or protection status;
- Outcomes of consultations; and

- Professional judgement based on local / regional / specialist experience.

6.16 Conservation status is described by the CIEEM (2018) guidance as follows:

'Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area.'

'Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.'

6.17 The assessment of whether the favourable conservation status of an IEF is likely to be compromised has been made using professional judgement based on an analysis of the predicted impact with reference to specific parameters outlined in **Table 6.2** and **Table 6.3**.

Table 6.3: 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

6.18 The nature of the effects has been classified as adverse, beneficial or no change. Where the matrix offers more than one significance option, professional judgement has been used based on all the available information to decide the most appropriate level of significance.

6.19 The assessment states the geographic context of the significance of effects and whether adverse or positive (site, local, district, etc). The assessment also references the EIA Regulations and whether effects are significant (moderate or higher) or not significant (minor, negligible and no change).

6.20 The broad definitions of the terms used are in line with the following:

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- Moderate: These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.

- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Timescale of Effects

6.21 For the purposes of the assessment the following timeframes are referred to in relation to the duration of ecological effects and/or the time required for mitigation measures to become effective:

- 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.

Limitations of the Assessment

6.22 Any limitations to surveys were recorded and are listed in the relevant survey reports presented as appendices to this chapter (in Volume 3 of this ES).

Baseline Environment

6.23 The baseline information on designations, biological records and baseline habitat information is presented in the PEA (**Appendix 6.1**) including full desk study. Key features and resources are presented with their evaluation below.

Designated Sites

6.24 Two statutory designated sites lie within 10km of the site: Cardiff Beech Woods SAC, a composite site of several discrete areas of woodland, the closest located approximately 2.83km south of the site, and the Severn Estuary SPA, SAC and Ramsar site located just under 10km to the south of the site. Both sites have importance for nature conservation at an international scale.

6.25 There are 19 non-statutory Local Wildlife Sites (LWS) within 2km of the site with three located within 250m of the boundary at the closest point.

6.26 The closest LWS is the Willowford SINC, an area of mature broadleaved adjoining the site to the north. The Willowford SINC is a near continuous series of small copses and woodlands and represents a large block of semi-natural woodland within a local network of woodland. Much of the woodland is dominated by an oak canopy, with more localised areas of ash, alder and birch. Some areas are Ancient Woodland and support assemblages of Ancient Woodland ground flora species. Its value for birds and bats is part of the reason for designation.

6.27 Tonteg Marsh SINC lies on the opposite side of the Church Village bypass to the west of the site. The SINC comprises a complex mosaic of wet and drier grasslands, wet scrub and species-rich woodland in the base of a valley. The strip of woodland is the closest part of this SINC to the site lying 80m from the boundary at the closest point. A watercourse within the SINC lies downstream of the engineered drainage channel within the site (D3) with a culvert beneath the Church Village bypass.

6.28 Taff and Rhondda Rivers SINC lies 187m from the boundary of the site at the closest point, and the designation covers the watercourse and extremely diverse and varied bank side habitats including woodland, floodplain grassland; neutral and marshy grassland. The Willowford SINC, a railway line and unclassified road are located between the site boundary and the SINC. Springs arising in The Willowford SINC in winter feed rivulet channels which will ultimately flow into the River Taff.

Habitats – Proposed Development Site

6.29 The habitats within the site are summarised below with more detailed descriptions provided in the PEA (**Appendix 6.1**). The habitats are illustrated on **Figure 6.1**.

Semi-Improved Grassland

Poor Semi-Improved Grassland

- 6.30 The majority of the site comprises grazed semi-improved grassland. The eastern section of the site is on relatively dry ground and is close grazed by sheep, supporting an overall low species diversity. Localised areas supporting a wider range of species are present along the woodland edge at the east of the site and on banks on the margins of the fields.
- 6.31 The fields in the east and south of the site lie on relatively dry ground with a species composition characterised by crested dog's-tail *Cynosurus cristatus*, and meadow grasses *Poa* spp. with Yorkshire fog *Holcus lanatus*, and sweet vernal-grass *Anthoxanthenum odoratum* with red fescue locally frequent and perennial ryegrass *Lolium perenne* occasional. Herb species abundance is generally poor characteristic of agricultural improvement with white clover, creeping buttercup and creeping thistle. Few other ruderals and herbs species occur at low frequency.
- 6.32 This grassland type has low value even in the context of the site (negligible value).

Semi-Improved Acid Grassland

- 6.33 The north-eastern boundary of the site adjoins unfenced grazed woodland within The Willowford SINC. The field margins adjoining the designated site have a species composition indicative of less agricultural improved grassland with a significant cover of a small number bryophyte species. Positive indicator species include frequent field woodrush *Luzula campestre*, bird's-foot trefoil *Lotus corniculatus*, common sorrel *Rumex acetosa*, and pignut *Conopodium majus*. Acid grassland indicators sheep's sorrel *Rumex acetosella*, heath speedwell *Veronica officinalis*, and heath bedstraw *Galium saxatile* are present but occur only rarely.
- 6.34 Localised areas of less improved grassland were also present elsewhere on banks and field margins with wavy hair grass, sheep's fescue, tormentil and heath bedstraw occurring in isolated locations.
- 6.35 These habitats have localised in extent isolated from each other and have importance in context of the site and the immediate surroundings (low value).

Semi-Improved Neutral Grassland

- 6.36 The fields in the western section site are lower-lying with varying degrees of at least seasonal waterlogging. In addition, habitat structure and species composition of several of the field has been influenced by the creation of cover crops for pheasants in 2018 which have been left as set aside and are now reverting back to grassland/tall ruderal vegetation.
- 6.37 In the pasture fields on wetter ground, the sward is characterised by a high frequency of soft rush tussocks with a typically short sward of Yorkshire fog, meadow grass *Poa sp.*, sweet vernal-grass and creeping bent *Agrostis stolonifera*. Species diversity is valuable, often limited to creeping buttercup *Ranunculus repens*, but with localised areas of higher diversity including indicator species cuckooflower *Cardamine pratense* and oval sedge *Carex leporina*, meadow buttercup *Ranunculus acris*, common sorrel *Rumex acetosa*, and lesser spearwort *Ranunculus flammula*.
- 6.38 The structure and composition of these grasslands is also influence by the creation of cover crops for pheasants in 2018 which were then abandoned and are now reverting back to grassland/tall ruderal vegetation, most notably broadleaved dock.
- 6.39 Grasslands managed for hay at the southern end of the site are generally drier but with a few patches of rush indicating wetter ground conditions.
- 6.40 Overall the fields were grass dominated with a low abundance of herbs. Sweet vernal grass *Anthoxanthenum odoratum*, red fescue *Festuca rubra*, meadow foxtail *Alopecurus pratensis*, meadow grass, creeping bent and crested dog's-tail are all frequent components of the grassland in these fields. Perennial rye grass, broadleaved dock and dandelion, creeping buttercup all occur

occasionally. Neutral grassland indicators are generally present at very low abundance including a few plants of yellow rattle *Rhinanthus minor*.

- 6.41 Very localised populations of sharp-flowered rush *Juncus acutiflorus*, with compact rush, smooth brome *Bromus racemosus*, common sedge *Carex nigra*, oval sedge, and glaucous sedge *Carex flacca* increase the value of the field. Meadowsweet *Filipendula ulmaria* is abundant alongside the adjacent roadside hedgerow.
- 6.42 The habitat has importance for biodiversity in the context of the site and immediate surrounds (low value).

Marsh/Purple Moor Grass/Sharp Flowered Rush

- 6.43 The large low-lying field dominated by soft rush tussocks, partially located on deep peat (over 80cm) is classified as a species-poor marsh. A dense layer of dead cut rush stems cover much of the ground. Localised grassy patches comprise Yorkshire fog, creeping bent and creeping buttercup and overall the species diversity is very low. Other species occurring at low frequency including hard rush, compact rush, tall fescue *Schedonorus arundinacea*, willowherb spp., and common marsh bedstraw. The eastern part of the field becomes waterlogged each winter.
- 6.44 A small field on the northern boundary supports rush pasture with abundant sharp-flowered rush *Juncus acutiflorus*. The most frequently occurring associate herb species were common marsh bedstraw, greater bird's-foot trefoil *Lotus pedunculatus*, lesser spearwort, marsh thistle, velvet bent *Agrostis canina canina*, willowherb species, and wild angelica *Angelica sylvestris*. A small populations of carnation sedge *Carex panicea*, tormentil *Potentilla erecta*, and green ribbed sedge *Carex binervis* grow on the margin and tussocks of purple moor-grass *Molinia caerulea* occur at low frequency. The western section of the field is dominated by soft rush and with fewer associate species.
- 6.45 Marshy grassland dominated by purple moor-grass *Molinia caerulea* occurs in only a few locations within the site, present on the low-lying field margins and in a section of dry ditch channel.
- 6.46 A number of very localised patches of sharp-flowered rush and/or purple moor-grass occur on low lying ground on the margins of wetter pasture fields with the invasive species, Himalayan balsam *Impatiens glandulifera* locally abundant.
- 6.47 This species diverse rush pasture is a S7 habitat of high importance for nature conservation. The extent of this habitat type within the site is small and consequently it has been classified as having importance for biodiversity in a local context (low value).

Hedgerows

- 6.48 In the western half of the site the hedgerow field boundaries are generally mature and scrubby showing signs of historic management such as coppicing and laying indicating they have been present for a prolonged period of time. They typically contain between three and four woody species with the most frequent being hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa*, willows *Salix* sp., and field maple *Acer campestre*, and locally there is a high proportion of hazel *Corylus avellana*. Mature trees are frequent and some of the boundaries are now lines of mature trees. Oak *Quercus robur*, and ash *Fraxinus excelsior* occur frequently.
- 6.49 In the eastern half of the site, the few hedgerows that are present are very gappy and defunct, with large hedgerow trees absent.
- 6.50 In contrast, the hedgerows on either side of the central north-south road are subject to regular management and as a consequence have a dense structure to ground level. The height varies from 1.5 - 2.5m and the width between 1 - 2m.
- 6.51 While the defunct hedgerow in the east would have importance for biodiversity in the context of the site only, the intact and mature outgrown scrubby hedgerows and lines of mature trees are valuable

features. The hedgerow network is a S7 habitat and as such would have importance for biodiversity in a local context (low value).

Mature Trees and Scrub

- 6.52 Many large and mature trees are present in the hedgerows in the western half of the site. A few small blocks of dense scrub are present on the field boundaries in the western part where the hedgerows widen out and thickest of bramble are localised.
- 6.53 The mature trees and are features contribute to the biodiversity value of the site, increasing structural diversity, increasing the sources of nectar, pollen and fruit as well as shelter for faunal species and additional niches for invertebrates.
- 6.54 The mature trees resource within the site is typical of the local context. The mature trees form an integral part of the hedgerow network and have biodiversity importance in a local context (low value).

Broadleaved Woodland

- 6.55 A block of oak (and ash) woodland forms the south-western boundary of the site. It has an even aged largely continuous tree canopy and may have originally been planted. The shrub layer is absent from much of the woodland where the ground flora is grass dominated with bluebells.
- 6.56 One section of the woodland is scrubby with few trees comprising shrub willows, hawthorn, and holly which create dense structured scrub. Bracken is locally dominant along the eastern edge.
- 6.57 A small copse comprising less than 10 semi-mature/mature oak trees adjoins the western boundary. The copse has 30% canopy cover and a grassy ground cover with no shrub layer. Dense stands of Himalayan balsam are present on the boundaries adjoining the woodland.
- 6.58 The woodland habitat is dominated by an oak canopy and supports a few woodland ground flora species and is characteristic of a lowland mixed broadleaved woodland, a S7 habitat and is also connected to the wooded stream W3 and other woodland habitat in the wider area via the network of hedgerows.
- 6.59 The Willowford SINC is a near continuous series of small copses and woodlands including some areas of Ancient Woodland. The habitat is primarily dominated by oak, with more localised ash, alder and birch, with hazel, willow and hawthorn. Ancient Woodland ground flora occur in parts of the SINC with bluebell, wood anemone, dog violet, bugle, primrose, red campion, wood speedwell, male fern, broad buckler fern and hart's-tongue fern. The Willowford SINC represents a large block of semi-natural woodland within a local network of woodland and is good quality woodland for birds and bats.
- 6.60 With connectivity to further woodlands in the locality, the woodland within the site has ecological importance in the context of the site and immediate surroundings (low value).

Ditches and watercourses

- 6.61 Many ditch channels run alongside hedgerows/hedge banks in the western part of the site.
- 6.62 The ditch channels vary from shallow to steep sided. The majority of the ditches are shaded with bramble, bracken and/or common woodland ground flora species on the banks. Shallow standing or running water are present during at least part of the year in many but there are no areas of deeper open water at any time of year. Aquatic vegetation is largely limited to more open areas with floating sweet-grass the only frequent species, but short sections of channel (adjoining the very large low-lying field) support a more diverse wetland flora with sharp flowered rush, purple moor-grass both frequent.
- 6.63 A wide engineered drain lies in the north-western part of the site has a shallow (diffuse) water flow. The base of the drain is 3m channel bounded by 1-2m high banks, lined to the south by mature oak and birch trees on the northern side and by bramble thicket with occasional trees. Mature shrub

willows have regenerated in the base and there are localised populations of several wetland plants including marsh marigold *Caltha palustris* and water horsetail *Equisetum fluviatile*.

- 6.64 The other watercourses are located on the site boundaries. At the northern boundary of the site the central field boundary ditch channels, running east-west through the western section of the site, widen and becomes a watercourse flowing off site to the north-east.
- 6.65 A tree lined fast flowing stream within a gully runs along the southern of the western part of the site and a narrow ditch/stream channel with very shallow running water lies beyond the southern boundary of the eastern section of the site. Off-site to the east, there are several springs within the adjoining semi-natural woodland within 50m of the boundary. These flow into rivulets and small channels that flow away from the site boundary and will feed into larger downstream watercourses.
- 6.66 Watercourses lie within 2km of the headwater classify as S7 habitats. The network of field ditches and the wider drainage channel (D3) are features that directly contribute to the value of the network of hedgerows and have importance for biodiversity at a local level (low value).

Waterbodies

- 6.67 One pond is present within the site (P3), with a second pond (P1) adjoining the site.
- 6.68 Pond P3 is approximately 15m by 12m with a central island. The pond is located in an area of shallow peat and a broad shallow ditch channel with dense rush and tall herb runs westwards from the pond to the field boundary. The island is regenerating shrubs willow growing on sphagnum mosses.
- 6.69 The banks around the edge of the pond support a good diversity of wetland plants alongside the abundant soft rush including velvet bent, creeping forget me not *Myosotis secunda*, bulbous rush *Juncus bulbosus*, marsh pennywort *Hydrocotyle vulgaris*, marsh speedwell *Veronica scutellata*, water purslane *Lythrum portula* and common cotton grass *Eriophorum angustifolia*.
- 6.70 The feature classified as Pond P2 is a dry steep-sided depression in a wooded copse which in summer becomes a stand of Himalayan balsam.
- 6.71 P1 lies outside of the site boundary. It is a large ring 'pond' consisting of a 10m wide channel enclosing a large flat central island of marshy grassland. This pond has very turbid water and has been created in the recent past.
- 6.72 The condition of the open water habitats in the ponds is relatively poor but provide habitats that contribute to the value of the site for wildlife and have importance for biodiversity. The diversity of wetland plants associated with P3 confers the waterbodies as a whole as important in a local context (low value).

Cable Route - Habitats

Buildings and Hardstanding

- 6.73 The proposed cable route extends 1.8km north from the Proposed Development to the National Grid site on Tonteg Road, running beneath sealed surface roads for its full length. Extending out of the site the route follows a single lane track bounded by hedgerows for 0.8km before crossing beneath the railway. The route then extends through Treforest Industrial Estate for 1km, adjoining areas of hardstanding and buildings.

Hedgerows

- 6.74 Tall, dense, hedgerows comprising a mixture of native species are present along the cable route section extending from the site. The hedgerow structures vary with recently cut hedgerows bordering fields and residential garden while along the woodland edge they are overgrown with sections

developing into treelines and merging with adjoining scrub and woodland. Young to semi-mature trees are present within and adjoining the hedgerows.

6.75 Between the hedgerow and road the hedgerow base is typically 0-1m in width and consists of species such as false oat-grass, bracken, common nettle and willowherb species. The hedgerows are located on steep earth banks up to 1m in height along the roadside.

6.76 As with the main development site, the hedgerows alongside the cable route are part of the wider network and classify as a S7 habitat and have importance for biodiversity in a local context (low value).

Faunal Species

6.77 The use of the site by protected species and its value for these species are described briefly below. Full details of the Phase 2 surveys undertaken are provided in the survey reports (**Appendices 6.2 – 6.3**).

Bats - Roosting

6.78 Mature and semi mature trees, in particular oak, ash, beech and sycamore are present within the hedgerows and along the woodland edge. Many are of a sufficient age and size to have developed cavities with the potential to support roosting bats.

6.79 Beyond the site boundary there are several farm buildings adjacent to site with further residential buildings beyond which may have the potential to support roosting bats.

6.80 Under a precautionary basis it should be assumed that some of the trees within the site and immediate surrounds and nearby buildings could be used by roosting bats during both the construction and operational phases.

6.81 Transitional roosts of common species are widespread and used by a small number of bats. If present, these would typically be of importance at a site or local context. A higher value roost such as a maternity colony of a common species or any roost of an uncommon species on site would have value in a district or county context.

Bats - Activity

6.82 In the western part of the site, the ponds, overgrown hedgerows/ditches and mature trees will be associated with an abundance of invertebrate prey and constitute habitats of high potential value for foraging bats. The areas of semi-improved neutral grassland and marshy grassland in the western part of the site and less heavily grazed grassland at the west of the site are also considered possible foraging areas for a few species (noctule) but the vast majority would typically feed over waterbodies and close to the hedgerow/woodland boundaries. The open fields with low gappy hedgerows in the eastern section of the site would typically be associated with lower levels of bat activity but the eastern site boundary adjoining The Willowford SINC is considered to be another flight line and foraging area.

6.83 The site has the potential to have importance for foraging bat species in a local context (low value).

Dormouse

6.84 Suitable habitat for dormouse is present within the site and surrounding area and there is potential for dormouse to be utilising the hedgerow network within the site. The intact, dense and scrubby hedgerows provide cover and food sources and have good connectivity to offsite woodland.

6.85 The defunct hedgerows and field boundary fences in the eastern section of the site have very poor connectivity and are considered unsuitable for dormouse.

- 6.86 Outside the site boundary to the east the woodlands are grazed by sheep and have only a sparse shrub layer. The tree canopies provide connectivity and could be used by dormouse if there is a resident population.
- 6.87 A recent record of dormouse from woodland on a disused railway line to the north of the site indicates that there is a dormouse a population in the local area.
- 6.88 Under a precautionary approach, the western section of the site has potential importance for dormouse in a local context (low value).

Badger

- 6.89 An inactive badger sett is located at the base of a hedgerow beyond the northern site boundary. The sett comprises a single, inactive entrance and a single mammal push-through was present beneath a fence within the site. No signs of recent badger activity have been recorded within the site over the survey visits.
- 6.90 Badger is a common and widespread species of low conservation importance. Based on the lack of signs of recent activity and the inactive status of the single outlier sett badgers are considered absent from the site. The presence of a disused sett indicates that badgers are active in the locality and that at least part of the site is likely to form part of an active territory. There is potential for the off-site sett to become occupied by badgers in the future or for new setts to be dug within the site.
- 6.91 The habitats are considered to have importance for badgers in the context of the site only (negligible value).

Otter

- 6.92 The on-site watercourses have very low value for otter being too shallow to support significant prey populations and lacking dense cover to conceal laying up places or holts. No signs of otter were present along the watercourses during the survey. It is concluded that the habitat does not form an important part of an otter's territory and would be used at most infrequently. Otters are considered to be absent from the site and are not considered further in the assessment.

Water Vole

- 6.93 Potentially suitable habitat for water vole within the site and adjoining habitat consists of the ponds P1 and P3, and the slow flowing stream W2. The large area of soft rush dominated marsh in the lowest lying part of the site supports a high population of small mammals with a large number of feeding signs and runs beneath the layer of dead rush vegetation carpeting the ground. Detailed water vole surveys were undertaken in 2021 and 2022. The banks of the ponds and stream were systematically searched and multiple north-south transects were walked across the soft rush marsh. No signs of water vole activity were recorded during any of the survey visits.
- 6.94 This species is considered to be absent from the site and is not considered further in the assessment.

Hedgehog

- 6.95 Hedgehog have been recorded within the local area and hedgerows and hedge base flora provide suitable habitat and dispersal routes for the species. The site is considered to have importance for hedgehog in the context of the site (low value).

Birds

Breeding Birds

- 6.96 A total of 43 species were recorded within the survey area during the four site visits. Of these species, 27 were confirmed to be breeding or probably breeding in habitats within the site or on the

site boundary with two additional species classified as possibly breeding. Thus equating to an assemblage of 29 species breeding on-site.

- 6.97 Eleven of the breeding (or probably breeding) species nesting within the site qualify as being of 'conservation interest' because of their inclusion on the Welsh Birds of Conservation Concern (BoCC) Red and Amber Lists and/or because they are listed as Section 7 Species as defined in the Environment (Wales) Act 2016.
- 6.98 Two Welsh BoCC Red List species are breeding on site: whitethroat (1 territory) and willow warbler (4-5 territories). Bullfinch, a further Red List species, was recorded during the survey and was classified as a possible breeding species.
- 6.99 Three species listed on S7 and on the Welsh BoCC Amber List were recorded: dunnock, song thrush and skylark.
- 6.100 Dunnock territories were recorded in many of the hedgerows and there were a number of song thrush territories within and outside the site. Skylark were holding three territories within the eastern section of the site in early spring but all had dispersed by the start of June. Five other Welsh BoCC Amber List species were recorded as breeding within or close to the boundary of the site: tree pipit (1-2 pairs), mistle thrush (1-2 pairs), long tailed tit (1 pair), goldcrest (1 pair), and mallard (hand reared birds).
- 6.101 In addition, barn owl was observed hunting over long grassland in the southern part of the site during an evening vantage point survey. Parts of the site are associated with an abundance of small mammals, most notably the extensive low-lying marsh, and barn owl are very likely to regularly hunt in this part of the site. The confirmation of barn owl presence in the middle of the nesting season increases the chances of an active nest in the surrounding area.
- 6.102 The majority breeding species are classified as being important in the context of site (low value). This includes very common breeding species that will occur in relative high abundance in the wider countryside and/or urban areas and it includes species of conservation interest that are relatively widespread and only in very small numbers on-site.
- 6.103 With a higher number of territories, the populations of song thrush and willow warbler have been classified as being important in the context of local area (low value).
- 6.104 Tree pipit and barn owl are less widespread species and even individual breeding pairs would have at least local and possibly district level importance (low-moderate value).

Wintering Birds

- 6.105 In total 43 species were recorded within the site, or in habitats close to the site boundary, with 17 of these species classified as being of high or moderate conservation concern in Wales and/or species of principal importance in Wales.
- 6.106 In addition, four widespread bird species that are listed as of moderate concern in the UK were recorded on site (wren, wood pigeon, stock dove and dunnock) but are currently on the Green List for Wales.
- 6.107 Most notably a flock of 70 linnets (high conservation concern) were recorded roosting in trees and hedgerow, feeding in fields during a late winter survey but were only recorded on one other survey visit. A flock of this size is notable in the County context,
- 6.108 The other wintering bird species present in larger flocks were starling (high conservation concern) with a peak count of 275 roosting and feeding in fields both within and outside the site – local importance
- 6.109 Redwing (high conservation concern) flocks were recorded throughout early and mid-winter with a peak count in November of 70 birds present in multiple small flocks feeding in hedgerows and on

the ground. Redwing is common and widespread in the winter and flocks were considered notable in the context of the site and immediate surrounds.

- 6.110 Other species of conservation concern recorded in small numbers were bullfinch, woodcock, kestrel, skylark, mistle thrush, reed bunting, fieldfare, long tailed tit, song thrush, green woodpecker, and snipe.
- 6.111 The assemblage has been assessed as having local importance for biodiversity (classified low value)

Great Crested Newts (GCN)

- 6.112 Ponds within and adjoining the site (P1 and P3) were deemed to have some potential to support great crested newts *Triturus cristatus*, both achieving 'average' in the Habitat Suitability Index (HSI) assessment. Both ponds returned negative results when analysed for GCN eDNA and there are no historical records of GCN being present in the local area. It is therefore concluded that GCN are absent from the ponds and not breeding on site.
- 6.113 Suitable terrestrial habitat for GCN within the site which provide cover and potential foraging habitat include hedgerow bases, taller areas of grassland and marshy grassland. Gaps between tree and shrub roots, larger rocks and logs provide potential hibernacula.
- 6.114 The core habitat for GCN is within 50m of a breeding pond and the nearest surveyed ponds which may have suitability for GCN are over 175m from the site. Given the distance of potential breeding ponds from the site and limited extent of suitable on-site terrestrial habitat there is a low likelihood of individual GCN being present within the site.
- 6.115 This species is considered to be absent from the site and is not considered further in the assessment.

Reptiles

- 6.116 Slow worm and grass snake have been recorded in the local area and the habitats within the site have the potential to support populations of both species.
- 6.117 The mature hedgerow field boundaries, hedge banks and more scrubby woodland edge habitat all have higher potential value for slow worm.
- 6.118 The site also has potential value for grass snake. The ponds and adjoining areas of marshy grassland are the most optimal habitat including the extensive soft rush dominated marsh, but grass snake is far ranging and could hunt along field drains and in wetter areas of pasture grassland.
- 6.119 Some of the habitats on the boundary and adjoining site are also classified as potential habitat for common lizard, for example dry grassland banks but their extent is small and they are isolated from each other, reducing the likelihood of a population being present.
- 6.120 An adder was seen on one occasion close to the roadside hedgerow in a stand of bracken where dead growth from previous years has built up to form a thick layer of cover on the ground. Woodland is one of the optimal habitats for adder and the habitats beyond the site boundary have higher value for this species than the habitats within the site, most notably areas of open woodland with a bracken field layer beyond the eastern site boundary. Hedgerow field boundaries with banks and localised stands of bracken could fall within the territories of adders but the woodland habitats outside the site are considered to be the core habitat for the local population.
- 6.121 Habitats with high suitability for reptile species are not uncommon in the surrounding landscape. Overall, the site is considered to have importance for reptiles in local context (low value).

Invertebrates

- 6.122 The low botanical diversity of the grasslands that make up the majority of the site will limit their potential value for invertebrates, although the species assemblage at the site will benefit from the presence of aquatic and wooded habitats with mature trees, hedgerows, ponds, ditches and off-site woodland being the principal habitats of value for invertebrates in the context of the site.
- 6.123 There are historical records of marsh fritillary butterfly *Euphydryas aurinia* in the local area but currently the marshy grassland within the site is species-poor and dominated by dense soft rush tussocks and is considered to have very low potential value for this Local Biodiversity Action Plan (LBAP) priority species.
- 6.124 Overall, the site is classified as having importance for invertebrates only in the context of the site and immediate surrounds (low value).

Future Baseline Conditions

- 6.125 The UK Climate Change Risk Assessment for Wales (HM Government, 2012) identified the main potential risks to the natural environment as a result of climate change. Those risks relevant to the site are:
- reduction in soil moisture and lower river flows, and an increase in the frequency and magnitude of droughts;
 - low water levels and reduced river flows leading to increased concentration of pollutants from agriculture, sewage and air pollution damaging freshwater habitats and other ecosystem services;
 - soil moisture deficits and erosion impacting biodiversity and soil carbon and increasing risk of wildfires;
 - increased prevalence of invasive non-native species, pests and pathogens impacting on animal, plant and biodiversity;
 - loss of climate space, with species unable to track climate change; and
 - changes in the timing of seasonal events.
- 6.126 The UK Climate Change Risk Assessment 2017 (HM Government, 2017), confirmed that the following changes had already been recorded due to climate change:
- changes to the distribution of UK biodiversity;
 - changes to the composition of terrestrial, coastal and freshwater ecosystems;
 - northward shift in species distributions; and
 - changes in the timings of seasonal events.
- 6.127 While there are potential effects of climate change on the future ecological baseline it is difficult to accurately predict and quantify the potential impacts of climate change on ecological systems.
- 6.128 The complexity of ecosystems and the myriad interactions between species and physical environmental characteristics present a challenge to modelling these systems.
- 6.129 In the context of the site, anthropogenic effects on biodiversity i.e. management and land use, are likely to be more significant to the future baseline conditions.
- 6.130 Qualitative assessments of observed biodiversity changes, and the likely biodiversity changes due to climate change have been defined in studies (Morecroft, M.D. & Speakman, L.,2015). Observations and predictions for habitats relevant to the site are described below.

Broadleaved Woodland, Hedgerow, and Scrub

- 6.131 Tree death following drought has been recorded at long-term monitoring sites. Those species most sensitive to this effect are beech, birch and sycamore. Such effects can lead to major changes in the composition and structure of woodland. Some tree species also show reduced growth rates during dry summers.
- 6.132 Changes in woodland composition are possible as a result of decreased rainfall and longer, warmer summers. The different responses of canopy and ground flora plant species may also lead to changes in woodland composition.
- 6.133 Additional effects may occur due to changes in pest and disease ranges and prevalence or the introduction of new pests.

Marsh/Marshy Grassland

- 6.134 Areas of deep and shallow peat will be at higher risk of drying out, primarily during the summer months with a likely degradation in the habitat. The status of the peat within the on-site habitats is not known and will need to be defined through monitoring of water levels and waterlogging across the habitat. Where permanently waterlogged the habitat will function as a carbon sink with climate change resulting in increased drying out of the habitat to potentially become a carbon source with increasing release of carbon into the atmosphere.

All Grasslands

- 6.135 Increasing temperatures have promoted earlier spring greening of grasslands and a longer growing season which may be beneficial for plant species and their associated invertebrate assemblages.
- 6.136 However, decreased or less reliable summer rainfall could result in less plant biomass and changes in plant community species composition, favouring species adapted to warmer, drier conditions. This could in turn affect the abundance and species composition of the associated invertebrate assemblage.
- 6.137 Many grasslands are likely to remain broadly similar in character with a temperature rise of a few degrees unless those grasslands are on the edge of their climatic range.

Faunal species

Bat

- 6.138 Juveniles are often more vulnerable than adults to extreme weather events (e.g. spring drought, flooding and cold winters). Therefore, there can be knock-on impacts on bat populations. Persistent heavy rain can decrease flying insect prey availability for bats.
- 6.139 Higher summer rainfall has been associated with greater insect abundance, increasing survival rate of some bats species, although the opposite effect is seen with drier springs and summers. Warmer winters resulting in reduced hibernation periods can reduce body condition, breeding success and survival rates.

Birds

- 6.140 Warmer winters since the 1990s have increased bird survival rates of many common and widespread bird species. Bird ranges in the UK have shifted north and warming has been associated with an increase in the diversity of bird communities of generalist species populations.
- 6.141 Changes to invertebrate prey abundance and diversity due to changes in soil moisture and rainfall could impact on many bird species. Increased winter rainfall may adversely affect winter survival if it reduces prey availability.

Reptiles

- 6.142 Modelling indicates that some reptiles could expand their range northwards provided there is suitable habitat connectivity.

Invertebrates

- 6.143 Climate warming has resulted in northward range shifts of many southern and common British invertebrates and changes in butterfly communities. The impact of changes in temperature and precipitation varies between butterfly species, with the negative effects of warm wet winters greatest in species that overwinter as caterpillars or pupae.
- 6.144 Areas of climate suitability might increase for some species although species will vary in their capacity to benefit, especially in fragmented landscapes. Some invertebrate species may respond with behavioural or evolutionary adaptation to changing conditions. More extreme rainfall patterns are likely to affect flight periods and food availability for many insects.

Mitigation Measures Adopted as Part of the Project

Proposals

- 6.145 The proposed site layout (**Figure 2.1**) details the extent of solar arrays and locations of the associated infrastructure comprising internal temporary roads (unsealed tracks), inverters, transformers and substation(s).
- 6.146 The Landscape Masterplan (**Figure 5.65**) illustrates the retained and proposed habitats which have been incorporated that will be managed for biodiversity over the lifetime of the Proposed Development.
- 6.147 The static solar panels are arranged in a series of rows. The support frame uprights will be pile driven into the ground, with 'string' inverters mounted onto the support frames. Only localised excavation will be required for the foundations of transformers.
- 6.148 The majority of the cabling associated with the development will be laid underground via surface dug trenches of approximately 1m deep and 50cm wide and backfilled. These will utilise existing access tracks within the site wherever possible. The entire cable connection route to the north of the site is routed below road carriageways and pavements.
- 6.149 All the internal tracks will be constructed from crushed stone with a geotextile membrane laid between the temporary road surface and underlying soil. The tracks will be built up above the existing ground level in all of the root protection areas of trees and hedgerows.
- 6.150 Existing tracks and farm gateways will be used wherever possible for the access tracks for the construction, maintenance and decommissioning of the Proposed Development.
- 6.151 Construction and installation of the Proposed Development is anticipated to take 6-8 months.
- 6.152 The Proposed Development is a temporary and fully reversible use with all infrastructure and equipment removed from site at the end of its operational life (approximately 40 years). Decommissioning will take up to 6 months. 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.
- 6.153 The Proposed Development will be designed to accommodate sheep grazing beneath and between the rows of panels, providing an efficient dual use of land for renewable energy generation and pasture.
- 6.154 The Proposed Development will be enclosed by 2.4m tall post and wire 'deer' fencing with 3m tall security cameras in selected locations. A single perimeter fence will be installed around all the solar arrays in the eastern section of the site. The western section will be sub-divided by

perimeter/security fencing which will be installed alongside the roadside hedgerow, and between public footpaths and the solar panels.

Habitat Retention and Protection

Hedgerows, Ditches and Trees

- 6.155 The Proposed Development will retain the network of field boundary hedgerows, banks and ditches avoiding the potential for loss and fragmentation by retaining long established features with indications of historic management coppicing and laying.
- 6.156 None of the gaps in the hedgerows will be widened and all the overgrown spreading hedgerow canopies will be retained and protected.
- 6.157 All the mature and semi-mature trees within the site are to be retained within the design. Stand offs have been incorporated between the field boundaries and the Proposed Development. Tree protection measures will also be implemented during construction to protect retained trees in accordance with BS 5837 (2012) – Trees in Relation to Design, Demolition and Construction.
- 6.158 The alignment of the perimeter fencing will be set back from the canopies of all the retained trees to avoid the need for surgery to tree canopies or limbs, helping to preserve their intrinsic value and safeguarding features of biodiversity value that could not be replaced over the lifetime of the Proposed Development.
- 6.159 The alignment of the perimeter fence, tracks and infrastructure will be set back by a minimum of 5m from hedgerows and drains, 10m from the boundary of non-designated woodland and 10-15m from the boundary of all SINC designated woodland.
- 6.160 Where the temporary tracks fall within the root protection areas of trees and hedgerows the construction will avoid the need for any excavation with all the tracks being built up above the existing ground level.

Ponds

- 6.161 Around Pond P3 a 10m buffer will be maintained between the closest solar arrays and the margin. Pond P1 whilst outside the site, is enclosed by the Proposed Development. It is set back from the solar arrays with a stand-off of between 30m and 75m to the west and a stand off of 15m to the east where the solar arrays are separated from the waterbody by a stream/ditch channel, bank and line of mature trees. There are stand offs of at least 30m between solar arrays and the off-site springs and pools in the adjoining broadleaved woodland.

Marsh Grassland/Marsh/Rush Pasture

- 6.162 Some of the areas of marshy grassland are being incorporated into the site layout where they will not be oversailed by solar panels.
- 6.163 The majority of the soft rush dominated marsh (west of Pond P1) located on deep peat will form part of the biodiversity enhancement area. The shallow ditch supporting mixed marsh vegetation (west of Pond P3) will also be retained.
- 6.164 The mixed species sharp-flowered rush marshy grassland in the north-western boundary is located outside of the perimeter fence and will be subject to non-grazing management. This area is linked to the SINC designated woodland beyond the site boundary and will have connectivity to Pond P1 and the area of marsh growing on the deep peat substrate.
- 6.165 Some of the more localised areas of marshy grassland are associated with field boundaries and will be located in the strips of habitat outside of the perimeter fence.
- 6.166 These habitats will be subject to management for biodiversity. The objectives and detailed proposals/actions and monitoring for each habitat area/habitat type will be set out in the Habitat

Mitigation and Management Plan which will be a working document running for the lifetime of the Proposed Development.

Broadleaved Woodland

- 6.167 All areas of woodland will be protected within the site layout and design. This includes two blocks of broadleaved woodland adjoining the western boundary and widened sections of field boundary where the hedgerows are wider than 5m, have some woodland stratification and support woodland ground flora species.
- 6.168 The context of woodlands will be retained with 10m stand offs between the edges of the blocks of broadleaved woodland and the alignment of the perimeter fence.
- 6.169 A wider stand-off of 15m will be created between the perimeter fence and all the SINC designated woodland adjoining the entire eastern boundary of the eastern section and the north-western boundary of the western section.

Wild Bird Seed Crop/Winter Cover Crop

- 6.170 Wild bird seed crops will be established and maintained on four of the field boundaries that are currently set aside. These would be subject to annual activities designed to provide sources of food for wild birds, especially overwinter including linnet, meadow pipit and skylark.
- 6.171 These will be 6-10m wide strips sown with a tailored mix of plants with a high proportion of quinoa and kale designed to provide a source of seed in autumn and winter as a food source for wild birds.
- 6.172 Existing vegetation in the existing set aside (predominantly broadleaved dock) will be stripped and linear areas shallowly ploughed prior to the sowing of the seed crop in spring. Sown plants will remain uncropped for 12 months and will provide food over winter.
- 6.173 Every subsequent spring over the lifetime of the Proposed Development the previous years' crop will be shallowly ploughed and the same area resown with the wild bird seed crop.
- 6.174 The control of injurious weeds (docks, thistles) will be a requirement if there is significant spread from the areas of cover crop, preferably through mechanical means to minimise the use of herbicides.

Field Boundary Habitats

- 6.175 Across the site the vegetation adjoining the field boundaries is variable and includes small areas of higher value habitat types.
- 6.176 Boundaries around fields in the eastern section are generally modified with low diversity but include semi-improved acid grassland alongside the entire boundary with The Willowford SINC, with part of this habitat falling outside the perimeter fence.
- 6.177 In the western section of the site retained habitats are diverse and include banks with unimproved acid grassland, stands of sharp flowered rush/purple-moor grass, and ditch-side tall herb vegetation as well as set aside. Many of the margins are undulating and the micro topography of the ground contributes to the diversity of species and overall biodiversity value. Many of the mature hedgerows have wide spreading canopies and the field boundaries comprise shaded wooded grassland and ground flora including many stands of bluebell/bracken.
- 6.178 The objectives and detailed proposals/actions and monitoring for each habitat area/habitat type will be set out in the detailed Habitat Mitigation and Management Plan which will be a working document running for the lifetime of the Proposed Development. This document will address potentially conflicting management objectives including maintaining the value of all the existing small areas of higher value habitats, enhancing lower value habitats through long term management, providing areas of dense grassland cover for fauna and maintaining/increasing nesting opportunities for birds of conservation concern including willow warbler, tree pipit, and linnet.

Additional Features

- 6.179 Ten bat boxes will be installed on mature trees in hedgerows within the site. The bat boxes will be installed higher than 4m above ground level. They will be installed in pairs on the east or west facing sides of the trunks to provide a variation in the temperature and conditions in boxes in close proximity to each other. The boxes will be constructed from woodcrete, woodstone or an equivalent long-lasting material that will require minimal maintenance over a 15- 25-year period.
- 6.180 Two barn owl nest boxes will be installed on large trees, one on the western boundary and one on the southern boundary.
- 6.181 In addition, twelve tree mounted bird boxes will be installed. Four woodcrete, woodstone or equivalent boxes with circular entrances of either 26mm or 32mm, six boxes designed for use by starling to be installed in two groups of three with the groups located within 150m of each other and two open fronted bird boxes with the potential to be used by redstart.

Assessment of Construction and Decommissioning Effects

Statutory Designated Sites

- 6.182 All the statutory designated sites are located over 2km from the site. No impact pathways have been identified between the construction activities within the site and these designated sites resulting in **no change**.

Non-Statutory Designated Sites

- 6.183 Of the 19 non-statutory sites located within the 2km search radius of the site, three are located within 200m of the site boundary and have at least a degree of connectivity to the Proposed Development.

The Willowford SINC

- 6.184 A minimum 10m stand-off will be implemented between the Proposed Development and Willowford SINC, providing a buffer between the working area and designation. The stand-off will include appropriate root protection zones for larger trees. Hedgerows within the Proposed Development will be retained and protected, maintaining habitat connectivity to the SINC.
- 6.185 There will be no artificial lighting within the Proposed Development during construction.
- 6.186 Best practice guidance should be followed throughout the construction phase which will include measures to prevent pollution such as preventing run-off of chemicals into the adjoining habitat including the wet woodland habitat and springs within The Willowford SINC.
- 6.187 Himalayan balsam (Schedule 9 of the Wildlife and Countryside Act 1981) is locally abundant in the site and was also noted in a few locations inside The Willowford SINC. In the absence of stringent measures to avoid the unlawful spread of this plant within the site, works during installation would have the potential to result in Himalayan balsam establishing in additional parts of the SINC.
- 6.188 The implementation of appropriate protective measures as detailed in a Construction Environment Management Plan (CEMP) would ensure there is no direct or indirect impacts on habitats within The Willowford SINC.
- 6.189 The assessment has concluded there will be **no change** to its value or status.

Tonteg Marsh SINC and River Taff SINC

- 6.190 The stand-offs from watercourses are built into the site layout. The implementation of appropriate protective measures would be detailed in a Construction Environment Management Plan(CEMP), which could be the subject of a planning condition, would ensure there are no indirect impacts on

habitats within Tonteg Marsh SINC downstream of the Proposed Development with hydrological connection via the wide engineered channel (Ditch D3).

- 6.191 Seasonal springs lie close to the eastern site boundary within The Willowford SINC. There is a distant hydrological connection with the flow eventually entering the River Taff SINC beyond the railway line and unclassified road.
- 6.192 Following of best practice guidance will prevent adverse impacts and this assessment has concluded there will be **no change** to the value or status of either of these SINCS.

Other SINCS

- 6.193 No impact pathways have been identified on other SINCS located further from the site and, accordingly, there is **no potential for change** as a result of the Proposed Development.

Habitats

Hedgerows and Mature Trees

- 6.194 The site layout has been specifically designed to avoid potential impacts on the hedgerows within the site through the use of existing farm access tracks to avoid the need to create new gaps and the use of stand-offs to maintain a buffer alongside every field boundary. Stand-offs incorporate all ground within the root protection areas (RPAs) of all the hedgerow trees, which are integral to the value and status of the hedgerows.
- 6.195 Should sensitive environmental practices not be implemented localised effects on retained hedgerow habitats are possible during the construction activities on the field boundary, including the access track which will run parallel to many of the hedgerows many of which are mature with wide spreading branches extending over the edge of the field.
- 6.196 Maintaining a construction stand-off zone should prevent direct damage to hedgerows but some localised cutting back of branches is likely to be required during the construction phase. Potential indirect impacts include the deposition of dust onto adjacent habitats in dry weather, during the construction of the access track.
- 6.197 Overall, in the context of the implementation of a robust CEMP, the predicted impact on the hedgerow network is classified as **no change** with an effect of **no significance**.

Poor Semi-Improved Grassland/Semi-Improved Neutral Grassland/Semi-Improved Acid Grassland

- 6.198 During construction, direct effects on the habitats are relatively limited. There will be a long-term loss of grassland where access routes are constructed, either through excavation or from construction on top of the existing ground level. A small proportion of a section of surfaced access track will fall inside most of the fields but only a very small proportion of the total area of each field would be directly affected by the loss of habitat or from temporary disturbance during their construction.
- 6.199 There will also be access for vehicles across fields, including marshy grassland, to deliver solar panels to their point of installation. Depending on the timing of installation and type of vehicle, seasonally wet ground would be susceptible to temporary disturbance and compaction across wider parts of wetter fields. In comparison, drier grassland, including localised areas of semi-improved acid grassland, would be unaffected by short term vehicle access.
- 6.200 Localised excavation will be required for the foundations of transformers resulting in additional small-scale habitat loss.
- 6.201 All the solar panel support frame uprights will be pile driven into the ground, while the 'string' inverters will be mounted onto the support frames.

- 6.202 During construction and decommissioning temporary site compounds will be required to host staff facilities, take deliveries of components and store plant and equipment securely while not in use.
- 6.203 The magnitude of the impact on these grassland habitats is negligible. The habitats vary in value but together have value in a local context. The significance of the effect is up to **negligible adverse** (site level effect).

Marsh/Marshy Grassland

- 6.204 Solar panels will be installed in approximately two thirds of the soft rush dominated marsh in the north-western part of the site but with the avoidance of the majority of the lowest lying area with an underlying layer of deep peat.
- 6.205 The majority of the soils around the perimeter of the large field were subject to disturbance and the import of soil material during the construction of the Church Village Bypass directly to the north of the site. The installation of the solar panels and piling of the supports would not adversely affect the habitat or substrate.
- 6.206 Vehicle access across the seasonally waterlogged field to deliver solar panels to their point of installation could affect the habitat depending on the timing of installation and type of vehicle required, with the ground susceptible to temporary disturbance and compaction. Due to the higher water content of the soils, the temporary installation of bog mat roads could be required to enable access for the movement of panels.
- 6.207 The main area of sharp flowered rush (0.1ha) is located outside the footprint of the solar panels, but there are two smaller less diverse areas of this habitat type in locations where solar panels will be installed. No access tracks or infrastructure are located in these areas, limiting the loss to works relating to piling the supports and transporting the panels.
- 6.208 Overall, the magnitude of the impact on marsh and marshy grassland habitat is low. The habitats have value in a local context being small in extent and the significance of the effect is **minor adverse** (site level effect).

Ponds, Ditches and Watercourses

- 6.209 All ponds, ditches and watercourses will be protected from any direct impact resulting from construction activities with 10m stand-offs from ponds and 5m stand-offs from ditches and boundary watercourses.
- 6.210 The access track will cross the central ditch in two locations, one of which is an existing farm access track with a narrow diameter culvert.
- 6.211 The track and culvert will need to be constructed over the ditch channel at the second crossing point which is currently a shallow ford.
- 6.212 The access track will also cross vertical sided ditch channels connected to P1 and P3. In both locations the access track is aligned to an existing vehicle cross point.
- 6.213 In addition, several sections of the access track on field boundaries will run adjacent to ditch channels. Most notably the section along the south-western boundary of the large low-lying marsh will run adjacent to ditch channels with areas of mixed species wetland vegetation.
- 6.214 The site design will ensure there are no direct impacts on any of the ditch channels by maintaining the stand-offs and providing buffer zones for construction activities as site activities close to ditches could result in sediment and surface water run-off from working areas into the adjacent channels.
- 6.215 Pond P3 lies in the middle of a seasonally wet field with extensive marshy grassland with some diffuse movement of water through the habitats. Construction works upslope from the pond fall within a zone where the mobilisation of any accidentally spilled pollutants could enter the pond.

- 6.216 Good working practices would need to be fully implemented in the vicinity of ponds and ditches to avoid the potential adverse effects on water quality during the construction and decommissioning phases.
- 6.217 Works in the vicinity of the watercourses on the northern and southern boundary, the engineered drain (D3) and on the eastern boundary closest to the off-site springs are limited to the installation of solar panels. With no other construction activities close to these features the potential impact pathways on watercourses are very limited.
- 6.218 Overall, and in the context of a robust CEMP being fully implemented as part of daily site activities, the predicted impact is classified as negligible. The effect would have **negligible significance** (up to a site level effect).

Broadleaved Woodland

- 6.219 All the woodland within the site will be retained with no direct impacts. The use of construction exclusion zones along the boundaries of woodland will help create separation from site activities and will be the main element of the environmentally sensitive working methods.
- 6.220 Importantly this approach will also protect the parts of the SINC designated broadleaved woodland complex that adjoin the site, including areas of Ancient Woodland and wet woodland.
- 6.221 For broadleaved woodland the predicted impact magnitude is classified as no change. The effect would **not have significance** in any geographic scale.

Species

Bats

- 6.222 Avoidance of the potential for any bat roosts in trees to be affected has been built into the site design through the retention and protection of all mature trees along with their root protection zones, and the alignment of stand-offs to avoid canopies overhanging the solar panels.
- 6.223 There will be no artificial lighting during construction, maintaining the existing context of potential roost features, foraging habitat and flightlines.
- 6.224 Piling of the solar panel supports would result in temporary periods of higher level of noise at the site. Noise associated with piling in any one part of the site will be short lived.
- 6.225 The incorporation of all the boundary hedgerows, ditches and streams into the site design will retain the network of flight lines and foraging habitat for the species that currently use the site.
- 6.226 There is no predicted impact on any roosts or anticipated changes in bat commuting and foraging activity during construction (**no change**).

Dormouse

- 6.227 The retention and protection of the hedgerow network, scrub and trees will protect habitats suitable for dormouse. The off-site woodland will be protected by the 10m stand-off between the site and the habitat.
- 6.228 There is no predicted impact on dormouse (if present in the hedgerows and adjoining woodland) during the construction phase (**no change**).

Badger

- 6.229 No signs of active badgers were recorded on site but they are a mobile species and the presence of the disused outlier sett near the site boundary shows they have been present in the area in the past.

- 6.230 Following good working practice, precautionary measures will be implemented during construction to prevent harm to badgers and other wildlife. Construction should require very few, if any, open excavations. Should any excavations be left open overnight, ramps or boards should be securely placed to allow animals to escape.
- 6.231 All hazardous materials brought onto site should be safely stored in designated areas that cannot be accessed by wildlife.
- 6.232 There will be negligible impacts on badgers during construction with **no significance** in a geographic context.

Hedgehog

- 6.233 The majority of higher value habitat for hedgehogs will be retained during construction. Measures undertaken to protect reptiles if localised removal of hedgerow bases is required, or where taller grass is being cut, will also protect any hedgehogs present.
- 6.234 The potential for impacts on hedgehogs are negligible and **not significant** in any geographic context.

Otter

- 6.235 Although otter is a species that will be active in the local area it is very unlikely to frequently use any of the onsite habitats (pond, ditches) or adjoining shallow headwater watercourses. The stand-offs created between waterbodies and watercourses and development activities, daytime working and no requirement for lighting during construction removes the potential for any effect on individual otters if moving through the site on along a site boundary during the construction period.
- 6.236 In the absence of any potential impacts during construction the significance is classified as no change.

Birds

Breeding Birds

- 6.237 The retention of the hedgerow network and field boundary habitats along with the mature trees and ponds will protect the nest sites of almost all the birds breeding within the site. With very little habitat loss associated with the Proposed Development foraging habitats would remain available for birds nesting in the site during the construction phase.
- 6.238 The stand-off from the off-site woodland will create separation between low impact construction activities (perimeter fence installation). Noise will be generated from piling the solar panel supports resulting in very short temporary indirect disturbance of nesting birds if the activities are undertaken during the breeding season.
- 6.239 Habitats with the potential to support nest sites of skylark and meadow pipit (shorter grassland) would be directly impacted during the breeding season. Completing the access track construction and installation of solar panels between September and February inclusive would avoid potential direct impacts on ground nesting birds while works between May and July, in the core breeding season, could have very high potential to impact on individual nests and fledglings.
- 6.240 During the breeding season suitable foraging habitats will not be subject to disturbance at dusk during construction with activities restricted to the daytime hours. It is unlikely that barn owl would completely avoid the site if prey populations remain high. The potential extent of foraging habitat will decline over the construction period as the grassland below the panels becomes inaccessible to hunting owls.
- 6.241 Under a precautionary basis, based on installation of the solar Panels during the breeding season and any associated works being subject to inspections by an ecologist for nesting birds, the magnitude of the impact during construction would be up to medium; only directly affecting a small

number of pairs but with additional medium magnitude indirect impacts with the potential to affect the behaviour of species nesting in adjoining retained habitats. The effect is classified as of up to **minor significance** (up to local level effect).

Wintering Birds

- 6.242 Construction activities timed over the winter period would result in the gradual change in context of the grassland in fields in which the solar panels are being installed. Noise generated from piling would create a level of disturbance that could alter the behaviour of birds.
- 6.243 Overwintering species that are more sensitive to human activity (such as snipe) would be likely to be displaced from the site during at least part of the construction period. As the solar panels are installed the context of the grasslands will change but there would be no significant change in food availability (seeds or invertebrates). At ground level below the panels there is an open aspect enabling birds to see the approach of ground predators and the solar panels could provide some protection from aerial predators.
- 6.244 The magnitude of impact on wintering breeding birds during construction is minor. The effect would have **negligible** significance (site level effect).

Reptiles

- 6.245 Whilst the habitats directly affected during construction generally have low value for reptiles, some of the fields are potential foraging habitat, most notably the large low-lying marsh with large population of small mammals. However, following a precautionary approach, it is assumed that populations of up to four reptile species are present at the site.
- 6.246 Vehicle movements across fields would have a low potential to result in injury to individuals. The reaction of people to adders, as a poisonous snake, is variable and there is a risk that construction staff could encounter an adder while working on site.
- 6.247 During the installation of the solar panels the noise and vibration resulting from piling would create disturbance for reptiles in the vicinity of the activity. Other construction activities and the installation of the perimeter fence will create disturbance close to field boundaries where reptiles are more likely to be present.
- 6.248 Dispersal from the active piling and field boundary activities is expected for all reptile species. Adder and grass snake are considered more sensitive to disturbance and are capable of travelling longer distances making the dispersal of snake species from the site during construction more likely.
- 6.249 The potential impact on each reptile species during construction is considered to be a low magnitude with only part of the site directly affected by construction at any one time. The effect on reptile populations is predicted to have **negligible** significance (site level effect).

Invertebrates

- 6.250 The majority of the site has low value for invertebrates and the potential for impacts is very limited taking into account the stand-offs being built into the design to protect higher value habitats including the ponds, hedgerows, mature trees, streams, ditches and off-site woodland.
- 6.251 Habitats that will be disturbed during the construction phase include grasslands managed for hay with localised areas of sharp flowered rush, soft rush dominated marsh, semi-improved neutral grassland (including areas with a high percentage of soft rush), and semi-improved dry acid grassland.
- 6.252 The localised extent of loss from the construction of the access tracks, installation of the solar panel supports and building of the associated infrastructure will be a very small percentage of the total habitat extents.

6.253 The magnitude of impact on invertebrates from construction activities is classified as negligible adverse. The effect has been classified as having **negligible** significance (up to site level effect).

Invasive Plant Species – Himalayan Balsam

6.254 Himalayan Balsam has established in several locations within the site, some of which overlap working areas in which solar panels will be installed.

6.255 The soils within the stands of this species will contain large numbers of viable seed. In relation to construction activities, soil picked up by the tyres of vehicles or shoes could result in seed being transported across the site. Consequently, there is a risk of construction activities resulting in the establishment of new stands in parts of the site where it does not occur and the plant becoming more numerous in locations where it has already colonised.

6.256 In the absence of control measures the adverse impact would have the potential to be of moderate magnitude in terms of impacts on other habitats and increasing the level of challenge to eradicate this invasive species.

6.257 A construction phase Himalayan Balsam Method Statement should be prepared detailing the measures that will be employed as part of the procedure for installing the solar panels and the construction of the tracks and wider infrastructure.

6.258 The extent of Himalayan Balsam should be topographically surveyed during the growing season (May and September) when growth will be visible above ground. All areas will be defined on an Invasive Non-native Species (INNS) Plan and physically delineated on the ground with fencing with a stand-off of 10m. Every activity within the fenced areas must be subject to INNS precautionary working methods.

6.259 Based on a robust INNS strategy the magnitude of the impact of Himalayan Balsam spread would be very substantially reduced.

6.260 Flowering during the construction period would need to be prevented through frequent cutting of vegetation in the control areas between June and October.

6.261 The measures would be designed to avoid any spread, resulting in no change, although under a precautionary basis the effect should be no higher than negligible magnitude and the effect would have **negligible** significance (site level effect).

Assessment of Operational Effects

Statutory Designated Sites

6.262 Given the distance between the site and all statutory and non-statutory sites and the nature of the operation, it is **not considered likely that there will be any operational effects** from the Proposed Development.

Non-Statutory Designated Sites

The Willowford SINC

6.263 The perimeter fencing will be set back from the adjoining boundaries of The Willowford SINC a minimum of 10m with the solar panels sited further from the boundary, creating a buffer between the Proposed Development and the SINC.

6.264 Human activity during operation will be limited to maintenance operations and there is no requirement for operational lighting.

6.265 The habitats within the buffer zone will be subject to biodiversity enhancement with no access for operational reasons other than habitat management and potentially fence maintenance

- 6.266 The minimum 10m stand-off will protect the springs and wet woodland habitat adjacent to the site boundary.
- 6.267 Site activities will include routine maintenance including the regular cleaning of the solar panels. The operational processes will need to include pollution prevention measures to prevent chemical run-off into adjoining habitats and clear emergency response actions in the event of accidental spillage.
- 6.268 More broadly the maintenance of the hedgerow network will retain habitat connectivity around the SINC and boundary habitat enhancement would have the potential to strengthen the linkages.
- 6.269 The part of The Willowford SINC adjoining the site to the east is currently an open unfenced boundary with intensively grazed pasture land. Currently livestock (sheep) graze the adjoining parts of the SINC woodlands restricting the regeneration of shrubs and trees. Over time this has resulted in a loss of woodland structure and a lowering of its ecological value.
- 6.270 Grazing animals in the site will remain within the perimeter fencing which will help reduce the level of grazing in the woodlands and have the potential to allow adjoining parts of the SINC to develop greater structural diversity.
- 6.271 The measures being employed during operation should ensure there is no adverse change or effects. Sheep flocks outside the site will also be grazing within the SINC woodland, but a reduction in intensity would have the potential to have a positive effect (low magnitude) of **minor beneficial** significance (in a site or local context).

Other SINC

- 6.272 The stand-offs from watercourses and the following of pollution control measures during operation will prevent adverse impacts on adjoining watercourses, including Tonteg Marsh SINC and the River Taff. No impact pathways have been identified on other SINC located further from the development.
- 6.273 It is concluded that the development will **not result in any change** to the status or value of any of the SINC in the wider area.

Habitats

Semi-Improved Grassland Habitat Types

- 6.274 The solar panels will 'over sail' between 25% and 40% of the pasture grassland resulting in shading for part of the day with, any effects on grass cover/growth being localised. The effects on different species will vary depending on shade tolerance. With the grassland strips between the rows being less shaded, some variation across the grasslands is expected.
- 6.275 During operation it is anticipated that all the grassland areas below the solar panels will be subject to grazing by sheep.
- 6.276 The temporary vehicle access used to cross fields to deliver the solar panels will remain as semi-improved grassland. If any repairs are required following installation, to restore areas of bare or compacted ground, the effects would be reversed within the first growing seasons during operation.

Poor Semi-Improved Grassland

- 6.277 The sheep grazed fields will continue to be subject to a regime of sheep grazing with the intensity/stocking density expected to be equivalent to current levels across the majority of these fields. Effects on the species composition of the pasture will be limited to the influence of increased shading
- 6.278 Due to the existing low value of the pasture, any change in composition has been classified a neutral outcome (no change) and significance of the effect is classified as **no change**.

- 6.279 The structure of the grassland will be dependent on the grazing intensity (number of sheep, duration of grazing periods), should this be lower than current stocking density the predicted outcome would be of **beneficial negligible** significance.

Semi-Improved Neutral Grassland (Soft Rush Grassland)

- 6.280 All the fields in the larger western section of the site are subject to cutting regime with two, or occasionally three, cuts annually during the growing season.
- 6.281 The change in land management would be expected to alter the species composition. In the wetter fields, soft rush is the most abundant species with patches of very short grassland. The current cutting management regime reduces the abundance of rush in summer maintaining a patchy mosaic of rush and grassy pasture, but also limits flowering in summer.
- 6.282 With the management of the fields changing to sheep grazing it is expected that soft rush will become more abundant over time. Grazing will also influence the composition of herb species but without summer cuts later flowering species may benefit.
- 6.283 The strips of marshy grassland alongside the hedgerows outside of the perimeter fence will be subject to a low intensity cutting regime designed to meet biodiversity objectives. The impact magnitude is classified as low and the effect would have **negligible** significance (site level effect).

Semi-Improved Neutral Grassland (managed for Hay)

- 6.284 The fields at the southern end of the site that are cut for hay in mid-summer will become pasture with a reduction in flowering. The current species composition will change with a reduction in species associated with hay management and species found in grazed pastures (such as annual meadow grass, creeping buttercup and white clover) would be expected to become more frequent. Diversity would decline.
- 6.285 The strips of grassland alongside the hedgerows outside of the perimeter fence will be subject to a low intensity cutting regime designed to meet biodiversity objectives.
- 6.286 Management broadly mirroring the regime used hay meadows will be adopted for a number of the field boundaries with wider expanses of unshaded grassland, most notably alongside the managed hedgerows on either side of the central unclassified road.
- 6.287 Enhancement of the lower value areas of existing grassland on the field margin will be achieved through increasing the wildflower component by supplementary seeding of selected positive grassland indicator species appropriate for the soil type including yellow rattle.
- 6.288 The overall impact magnitude is classified as low due to the reduced extent and more fragmented of this habitat. The effect is classified as being of **negligible** significance (site level effect).

Semi-Improved Acid Grassland

- 6.289 Part of the area of grazed semi-improved acid grassland will be located within the perimeter fence and will continue to be subject to grazing. The species composition in this habitat reflects the underlying soil type, slope, aspect and the limited use of fertilizers in the past but has a low abundance of indicator herb species.
- 6.290 Following the installation of solar panels the composition is not expected to change significantly. Herb species abundance is highest on partially shaded woodland edge and many of the acid grassland indicator species are shade tolerant.
- 6.291 The grassland outside of the perimeter fence will be taken out of grazing and will be subject to a cutting management regime with the objective of increasing the abundance of indicator herbs and reducing the high percentage cover of grass. Stockproof fencing would need to be installed on the site boundary where grazing animals can access this grassland from the adjoining woodland.

6.292 The impact magnitude is classified as negligible positive, based on positive outcomes of changes in management supported by monitoring. The predicted increase in the value of semi-improved acid grassland would be of **negligible beneficial** significance (site level effect).

Marsh/Marshy Grassland

Soft Rush Dominated

6.293 Solar panels will be installed across approximately 70% of the large low lying field supporting species-poor marsh, primarily in areas of soils disturbed during the construction of the bypass. As with the grassland habitats there will be a shading effect on the vegetation.

6.294 The marsh is currently subject to a cutting management regime with more than one cut over a single growing season. A proportion of the previously cut dead soft rush stems form a deep mat over the ground which is slower to breakdown where the duration of winter waterlogging is less.

6.295 During operation it is anticipated that the marsh will either be seasonally grazed by sheep when the ground is not waterlogged (potentially mid-spring through to early autumn). The dominance of soft rush reduces the value for grazing and an alternative would be the periodic cutting of vegetation between the rows of solar panels to maintain unconstrained access for operational activities. This is likely to be a requirement, even with sheep grazing because tussocky soft rush vegetation will naturally be the dominant cover.

6.296 A post and wire fence with an access gate will need to be installed around the edge of the area of deep peat to prevent vehicle access into this area during maintenance operations, with access limited to monitoring and habitat management activities. The vegetation on the area of deep peat would be subject to periodic cutting, at least during the first years to replicate the existing management regime while the water levels in the soils are monitored monthly to assess the status of the habitat and potential trends.

6.297 Ultimately changes in the habitat structure and species composition will depend on the management regime that is adopted.

6.298 The impact during the operational phase has the potential to be positive with a negligible or low magnitude. The effect would be of **beneficial** and either **negligible** or **minor** significance (site or local level effect).

Purple Moor-Grass/Sharp-Flowered Rush

6.299 Small areas of species-poor examples of purple moor-grass/sharp-flowered rush habitat will be partially shaded following the installation of the solar panels and will be within areas grazed by sheep. Neither species is particularly sensitive to shade and would not be expected to be preferentially grazed by sheep.

6.300 The areas of mixed species sharp-flowered rush pasture and associated wetland and acid grassland indicator species is located outside of the solar panels and perimeter fence and will be subject to targeted habitat management to maintain the status of the habitat protecting the varied ground conditions and promoting the value of the existing diverse species assemblage.

6.301 All areas of species-rich sharp-flowered rush habitat would ideally be managed by a low intensity late summer grazing by cattle, but where this is impractical a low intensity mowing regime would be adopted seeking to mimic cattle grazing.

6.302 Biodiversity enhancement proposals will target increasing the extent of this habitat type through targeting seeding (using techniques such as green hay), and a sensitive management steered by the results of biodiversity monitoring that will be ongoing over the lifetime of the Proposed Development.

- 6.303 A few smaller areas of this habitat type on the field boundaries (western section of the site) will be subject to management to safeguard and enhance. Associated with ditches and undulating ground they will be protected from damage by vehicles accessing the field margins to undertake management of grassland and hedgerows
- 6.304 Overall, the safeguard and expansion of this habitat type over the operation of the Proposed Development is classified as positive with enhancements of **negligible beneficial** significance (positive affects in the context of the site).

Hedgerows and Mature Trees

- 6.305 The design of the Proposed Development creates separation between the operational areas inside the perimeter fence and all the field boundary habitats including the mature hedgerow trees. Activities on the field boundaries will be limited to habitat management designed to meet biodiversity objectives and the associated monitoring of the outcomes.
- 6.306 Habitat management activities will be sensitive to varied ground conditions to safeguard the integrity of old hedgebanks and maintain undulating ground where the variations in the microtopography promote structural and species diversity.
- 6.307 Defunct hedgerows with large gaps in the eastern section of the site will be planted with locally native shrubs, increasing the length of hedgerows within the site and significantly improving field boundary connectivity between The Willowford SINC and the continuous hedgerows running on either side of the central unclassified road.
- 6.308 The operation of the Proposed Development should not result in any adverse change to the status or value of the hedgerow network and the associated features. In the long term (greater than five years) hedgerow planting will be beneficial, resulting a positive effect of **negligible beneficial** significance (site level effect).

Ponds, Ditches and Watercourses

- 6.309 The stand-off around P1 and P3 will help retain their immediate context and provide a buffer between maintenance operations and the waterbodies. The operational processes will need to include pollution prevention measures to prevent chemical run-off into adjoining habitats and clear emergency response actions in the event of accidental spillage.
- 6.310 The operation of the Proposed Development should not result in any change to the status or value of the ponds within and adjoining the solar park. The effect is classified as **not significant** in any geographic context.

Broadleaved Woodland

- 6.311 The stand-offs built into the site design establish buffers between the solar panels and site operations and the areas of broadleaved woodland, comprising small blocks of woodland on the boundary, wider sections of hedgerows with mature trees and woodland ground flora, as well as adjoining broadleaved woodland and streamside trees and shrubs.
- 6.312 Potential operational impacts on woodland are detailed within the assessment of The Willowford SINC above. The measures being employed to avoid the potential for any adverse effect on that designated site would also protect the other areas of broadleaved woodland within the site.
- 6.313 The eradication of Himalayan Balsam from the site during the initial years of operation would improve the value of the copse in the central section of the western boundary.
- 6.314 The operation of the Proposed Development should not result in any change to the status or value of the hedgerow network and the associated features. The effect is classified as **not significant** in any geographic context.

Species

Bats

Roosts

- 6.315 The incorporation of all the hedgerows and on-site woodland into the design, along with the protection of the immediate context of off-site woodland will retain all features available to bats as roost sites. Over the lifetime of the Proposed Development, the trees will continue to mature and should develop further deadwood and potential roost features increasing the potential value of the site for roosting bats.
- 6.316 Twenty new long lasting bat boxes (made from woodcrete, woodstone or equivalent) will be installed on field boundaries with trees around the site to provide additional roosting opportunities for bats. The boxes will be sited in pairs on selected larger hedgerow trees that are lacking in natural cavity features) The boxes will be installed 4m above ground level with the pairs of boxes facing south-east and south-west.
- 6.317 There are no anticipated adverse impacts on potential roosts within the site. The provision of additional roosting opportunities would provide additional opportunities. The impact is classified as negligible positive with an effect of **negligible beneficial** significance (beneficial in the context of the site).

Commuting/Foraging

- 6.318 The incorporation of all the hedgerows and on site woodland into the design, along with the protection of the immediate context of off-site woodland will retain the existing network of flight lines and foraging habitat for bats. The Proposed Development will remain unlit throughout the operational phase with minimal human activity associated with management and maintaining the existing habitat context.
- 6.319 The management of the site will maintain the value of the different grassland types and marsh on the field boundaries adjoining hedgerows. Field margin management should help to further diversify the structural variation in the grassland habitats through less uniform management including allowing selected areas of existing low value grassland to develop into tussocky grassland.
- 6.320 The abundance and diversity of invertebrate prey resources for bats should remain largely unaffected by the Proposed Development over its operational life.
- 6.321 There is no anticipated adverse impact on any bat populations with activity remaining at least equivalent to current levels. The outcome of no change is **not significant** in any geographic context.

Dormouse

- 6.322 The retention of the boundary hedgerows and on-site woodland within the design will retain all existing habitat of potential value for dormouse throughout the operational life of the Proposed Development.
- 6.323 The immediate context of the hedgerows and woodland edge would not change with no requirement for any operational lighting and very low levels of human activity associated with maintenance and habitat management.
- 6.324 The dense structured wide roadside hedgerows will continue to be trimmed back annually to maintain their current features. Very gappy managed hedgerows on the eastern side of the site will be subject to native shrub planting and then managed following the same regime as the roadside hedgerows.

- 6.325 The mature hedgerows will be subject to low intensity management to maintain their woody structure and protect the associated features. Old hazel stools that produce much lower numbers of nuts will be selectively coppiced to maintain the productivity of this food resource.
- 6.326 The existing hedgerows on the western side are mature with several lines of mature trees. Selective native shrub planting will infill gaps while avoiding adverse effects on banks and dry ditch channels including shading.
- 6.327 These measures will provide additional habitat and increased connectivity for dormouse in the medium term as they mature.
- 6.328 Fencing the off-site woodland from the grazed grassland below the arrays will help protect it from overgrazing, and in the medium to long-term should encourage a more extensive shrub layer to develop which would significantly improve its value for dormouse.
- 6.329 During the operational life there is potential for a minor beneficial impact on dormouse which is classified of **negligible beneficial** significance (positive site level effect).

Badger

- 6.330 There are no potential impacts on badger setts from operational activities. Should new setts be established within or adjoining the site, activities relating to the operation of the Proposed Development would not have any effect on their use or status. Habitat management activities would be required in the vicinity of field boundary setts including grassland management and hedgerow maintenance.
- 6.331 Any active setts would be identified and protection measures incorporated into management practices to avoid damage to their structure or disturbance of badgers.
- 6.332 Once operational the context of the fields within the site will change but permeability of the site for mammals including badgers is built into the site design. Regularly spaced openings will be incorporated into the base of the perimeter fence allowing badgers to easily move through each of the fields within the developed site. New sections of stockproof fencing, proposed to enable different grazing and management regimes, could create localised partial barriers to the movement of badgers. There will be no change in the connectivity of the site to the surrounding areas.
- 6.333 It is concluded that the potential use of the site by badgers will remain unchanged as a result of the Proposed Development, equating to a **neutral (no change)** effect.

Hedgehog

- 6.334 The site design will maintain and enhance habitat of value for hedgehogs through the retention of hedgerow bases, woodland and grassland. The management of field boundaries and woodland buffer planting is expected to result in an increase in invertebrate prey. There is expected to be **no change** in the value of the site for hedgehog over the operational life of the Proposed Development.

Birds

Breeding birds

- 6.335 The retention and protection of the majority of hedgerows, trees, field ditches and the offsite woodland habitats will maintain the primary features used by nesting birds. Many of the species nesting within field boundaries will also forage in these habitats remaining close to the hedgerow even when foraging close to the ground. Infill native shrub planting along hedgerows and sensitive management to maintain the structure of mature wide hedgerows will seek to increase the extent of key nesting habitats in the medium term.
- 6.336 A proportion of the recorded species nesting in the hedgerows feed in open grassland habitat including blackbird, song thrush, mistle thrush, woodpigeon, chaffinch, and goldfinch. The Proposed

Development will result in a change on the context of these habitats as described in the breeding/wintering birds construction effects section above, but the fields once grazed would continue to provide food for most of these species while changes in field margin management would provide new opportunities for finches to help offset a reduction potential food resource associated with the majority of the fields being grazed.

- 6.337 The heavily grazed and periodically cut grasslands in the existing site have limited value for nesting skylark territories with the few territories established in early spring being abandoned by the end of May. Skylarks are ground-nesting birds that utilise open habitats (and arable fields), making use of low but patchy vegetation to nest in.
- 6.338 Recent studies into the effects of solar farms on skylark has shown that although they generally do not nest beneath solar panels, they do nest within solar farms and incorporate solar farms into their territorial boundaries for foraging. There is also evidence to suggest that some birds may be attracted to the solar panels, creating more opportunities for shelter and nesting.
- 6.339 One field of the eastern side of the site (where a skylark territory was established in 2022) will be fenced from the other fields within the site and will be subject to a low intensity grazing management regime to seek to create a grassland with patchy variation in the sward height between 7cm and 20cm. Solar panels will not be installed in the central strip increasing the extent of unshaded grassland. Skylark breeding success within the site would be an enhancement.
- 6.340 The installation of solar panels will significantly reduce the extent of open grassland of potential value to barn owl, and none of the areas of grassland below solar panels would be available as hunting habitat. Areas of open grassland will remain in the north-western part of the site including approximately 30% of the low-lying marsh which supports high populations of prey species.
- 6.341 Grassland strips present on the field margins between the perimeter fencing and hedgerows will be subject to variable management. Many of these field margins in the north-western part of the site will be specifically managed as longer grassland with an optimal structure for hunting barn owl suitable, leaving some cuttings to breakdown and form a thatch of dead grass to attract small mammals. The site is expected to continue to be an active part of the barn owl territory but with the potential to be used on a less frequent basis.
- 6.342 Twenty long lasting bird boxes (made from woodcrete, woodstone or equivalent) will be installed on hedgerow trees distributed around the site to provide additional nesting opportunities for birds, including species of conservation concern (starling) and locally common species (common redstart. Boxes designed for use by starlings will be sited in two loose clusters with this species being semi-colonial. The boxes will be installed 3m above ground level away from roads and public footpaths.
- 6.343 In addition, two artificial barn owl nesting boxes will be installed on mature trees within the site, one on a mature tree on the southern boundary of the low-lying marsh and a second on a mature tree on the southern boundary of the western section of the site alongside the stream.
- 6.344 With positive management supported by the ongoing monitoring of key bird species (tree pipit, willow warbler, whitethroat, skylark and barn owl) to confirm presence/absence, the magnitude of impact on the breeding bird assemblage has the potential to be negligible positive. The effect would be of **beneficial negligible** significance (site level effects).

Wintering Birds

- 6.345 Winter food availability is expected to be a key factor in the continued use of the site by wintering populations of farmland birds.
- 6.346 The change in context of the grasslands in the operational site will have the potential to affect the wintering bird populations. Some of the strips of field boundary set aside (former pheasant cover crops) will become part of the grazed fields or become grassland on the field margin.

- 6.347 A number of the areas of field boundary set aside will become winter cover crops (wild bird seed mix including quinoa and kale) in the Proposed Development. These will be subject to annual re-instatement to maintain this enhancement over the Proposed Development's lifetime and will provide sources of food for local populations of farmland birds including linnet and skylark.
- 6.348 A few species feed on seed and soil invertebrates on ungrazed grassland fields with ruderals. These will become grazed fields and have a changed context below the solar panels. Although the context and structure of the grassland will change, they should continue to be used by the species including starling, redwing, fieldfare, and mistle thrush.
- 6.349 All the fields will remain grassland and field boundary grassland habitats should become more diverse through variation within a low intensity grassland management regime. The extent of tussocky grassland with tall herbs and ruderals will be increased and will provide some sources of food over winter. Annually cut field margins with wildflower diversity should increase sources of insect prey species.
- 6.350 The context of the hedgerows and woodland will be significantly altered. All the mature hedgerows will continue to be managed as tall, wide field boundaries with retained mature trees with no reduction in value for foraging and the overwintering species assemblage associated with them should remain unaffected.
- 6.351 Based on the incorporation of foraging habitat, any changes in the wintering bird population within the site is expected to be limited. Of the populations of highest value (linnet and redwing) specific measures are proposed and there is high potential for the site to continue to have importance for these.
- 6.352 Based on the most likely outcome the predicted effect is **neutral (no change)** with the possibility of a positive effect of negligible significance (site level effect).

Reptiles

- 6.353 Operational activities will not result in any direct effects on habitats of potential higher value for reptiles. Hedgebanks and ditches will be protected and subject to management. Most of the field margins adjoining hedgerows and woodland will be subject to low intensity management maintaining their value for reptiles and selected sections of the field margin will be managed as a tussocky sward through rotational management.
- 6.354 The field boundaries will continue to provide good wildlife corridors providing connectivity across the site and with the wider area. Prey availability in these habitats should not be affected with basking opportunities, cover and hibernation opportunities being maintained. The field boundaries will not be subject to any disturbance during maintenance activities.
- 6.355 The value of the grassland below the solar panels will change as a result of the Proposed Development. Areas subject to occasional cutting management will be grazed which is expected to create a shorter, more uniform sward with negligible cover. The grassland fields (including those with abundant soft rush) have lower value as reptile habitat and are not considered to have the potential to be core habitat for any reptiles. The partial shading is unlikely to have an adverse effect on the status of any reptile populations resident in the local area.
- 6.356 At the start of the operational phase the potential magnitude of impact on reptile populations is **negligible** and **not significant** in any geographic context. Over time, with positive outcomes from the protection and diversification of field boundary habitats there is good potential for a positive effect of **negligible beneficial** significance (site level effect).

Invertebrates

- 6.357 The invertebrate value of the grasslands in which solar panels will be installed will change as a result of the Proposed Development. Areas subject to partial shading would be associated with reduced invertebrate activity most notably in the grasslands managed for hay.

- 6.358 Highest value features, mature trees and the hedgerow network will remain unaffected by operations, as will the ditches and hedgebanks. Management of the field boundaries will create varying sward structures with a combination of actions to promote floristic diversity and the abundance of pollen and nectar sources as well as sections allowed to develop a dense tussocky structure, creating ecotones with mature hedgerows.
- 6.359 The safeguarding of the existing habitat features and microtopography coupled with field boundary management should have benefit for the overall assemblage of invertebrates utilising features within the site.
- 6.360 The predicted impact on invertebrates is positive with a negligible magnitude with the effect being of **negligible beneficial** significance (site level effect).

Invasive Species – Himalayan Balsam

- 6.361 Himalayan Balsam will continue to be present in habitats within and adjoining the site at the start of the operational phase.
- 6.362 An operational phase INNS Plan should be prepared setting out the measures that will be implemented to eradicate this species from the site.
- 6.363 The outcome of the activities undertaken during construction would be subject to monitoring at the start of the operational phase to define its exact extent and the location and size of control areas where specific management will be implemented.
- 6.364 The activities associated with the maintenance of the Proposed Development will have a low risk of spreading the seed of the plant. In contrast habitat management in locations where Himalayan Balsam is present will have a high risk of accidental spread, through seeds in soils being transported on the wheels of vehicles, and the movement of management contractors, as well as through the plant being allowed to mature and set new seed in habitats adjoining established stands.
- 6.365 In the absence of the control measures, the presence of Himalayan Balsam would have an adverse impact on other habitats within and adjoining the site.
- 6.366 By defining all stands as control areas clearly delineated on the ground, avoiding all non-essential movement through these areas, designing management activities using machinery that would avoid disturbing or moving soils within control areas, and preventing flowering it is expected that the plant would be eradicated from the site over a few growing seasons, during the initial part of the operational phase.
- 6.367 Even after the initial eradication, ongoing monitoring would be required to record locations of recolonisation and to re-trigger the control measures procedures as necessary. Where Himalayan Balsam occurs in close proximity to the site, off-site stands would be included in the control strategy (subject to landowner permission) to reduce the likelihood of future colonisation.
- 6.368 The removal of this invasive species will have a beneficial impact of low magnitude. This would be a positive effect of **minor beneficial** significance (potential local level effect).

Future Monitoring

- 6.369 All habitats subject to management for biodiversity will be monitored to assess the status and value of the habitats.
- Hedgerows, hedge banks and ditch channels
 - Purple moor-grass/sharp-flowered rush grassland (a S7 habitat)
 - Semi-improved acid grassland adjoining The Willowford SINC
 - Soft rush dominated marsh (deep peat)
 - Field boundary grasslands and woodland edge habitat

- Pond and margins
 - In the first years of operation, monitoring will review the delivery of aftercare management for all habitat creation and direct enhancement (including seeding or planting). Biodiversity enhancement will be primarily delivered through sensitive (and adaptive) management aligned to key objectives for habitats and target species.
- 6.370 Management will seek to increase the extent and diversity of a range of grassland habitats and the extent to which this is being achieved will be directly informed by monitoring of the habitat condition and plant species assemblages.
- 6.371 The species diverse example of purple moor-grass/sharp-flowered rush grassland (a S7 habitat) will be located within a Biodiversity Enhancement Area to be safeguarded. Through management the objective will be to safeguard the existing habitat and expand its extent into the adjoining soft rush dominated grassland and the adjacent marshy grassland field to the north of ditch D3 to provide enhancement.
- 6.372 The diverse wetland plant community associated with P3 and the adjoining shallow marshy ditch channel are a further area where safeguard and enhancement will have a high priority.
- 6.373 More broadly the different grassland habitats outside the perimeter fence will be assessed to ensure that any decline in the existing value are quickly identified and appropriate management/remedial action is initiated to achieve enhancement.
- 6.374 The area of deeper peat in the lowest-lying part of marsh will be subject to the monitoring of below ground water level and habitat status over the first two years of operation to determine its current status. Decisions on the actions that would have to be taken to minimise the extent to which it releases carbon into the atmosphere would be taken following the advice of a peat soil/hydrology expert.
- 6.375 The ongoing annual monitoring and management programme should be subject to a formal five yearly review over the operational life of the Proposed Development and should be modified if required to achieve higher biodiversity value.
- 6.376 Biodiversity monitoring over the lifetime of the Proposed Development will specifically inform where the existing biodiversity value has been enhanced and if additional measures are required to meet the requirements for biodiversity enhancement as defined in PPW and TAN 5.

Potential Changes to the Assessment as a Result of Climate Change

- 6.377 As described in the climate change section above, potential changes to habitats and populations as a result of climate change are difficult to predict. During operations anthropogenic factors such as site management are likely to be more significant for the biodiversity of the site and it is very unlikely that climate change would significantly affect the findings of this assessment.

Accidents/Disasters

- 6.378 Operational accidents/disasters relevant to ecology and nature conservation include the pollution incidents affecting the adjoining SINC designated habitats, ponds, watercourses or waterlogged areas of marshy grassland, as well as the accidental spread of the invasive plant Himalayan Balsam within the site and into the surrounding environment.
- 6.379 Best practice measures will be implemented by the construction teams and as part of the operation of the completed development. Pollution and other environmental protection measures will be built into the working practices for all relevant construction activities and as an integral part of the normal operation of the solar park. Safeguarding will include monitoring of environmental conditions and devising a protection system with definition of the remedial measures in the event of potential incidents.

Assessment of Cumulative Effects

6.380 The developments assessed for cumulative effects, and a brief summary of the proposals is given in **Table 6.5**. Summary text on relevant projects is provided below.

Table 6.4: Developments Considered for Potential Cumulative Effects on Ecology.

Application Ref	Description	Distance from Solar Farm	Planning Status	Potential for Cumulative Effect
DNS/3272053	Twyn Hywel Wind Farm	Over 4km		No
DNS/3280378	Mynydd y Glyn Wind farm	Over 4km		No
DNS/3266623	Cwm lfor Solar	Over 5km		No

6.381 The proposed Twyn Hywel Wind Farm lies over 4km to the north of the site with settlements and the Trefforest Industrial Estate creating significant separation between the two.

6.382 The proposed Mynydd Y Glyn Wind Farm lies over 5km to the northwest of the site, with the settlements of Church Village and Tonteg and extensive areas of upland pasture fields between the wind farm and the site boundary.

6.383 The proposed solar farm at Cwm lfor lies over 4m north of the site adjacent to the proposed Twyn Hywel Wind Farm.

6.384 The construction of the wind farms concurrently with the Proposed Development is possible. Cwm lfor is still at stage of viability review and if it comes forward to a full application construction would be expected during the operational phase of the Proposed Development.

6.385 The proposed wind farm developments are sited in upland locations on a mix of unenclosed habitats extending into grazed pasture towards the periphery. The sites have extensive areas of closely grazed grassland/pasture limited ecological value but Twyn Hywel Wind Farm lies in area with blanket bog, upland heath, mire communities and acid grassland. These habitats are relatively extensive and of high value for nature conservation.

6.386 Of the higher value habitats present in the other proposals, all but the marshy grassland is absent from the Proposed Development. The extents of higher value examples of this habitat type within the Proposed Development are negligible in comparison to the marshy grassland habitats in the upland landscape. The small extents of higher value habitat will be retained in the Proposed Development and there would be no cumulative effects on any habitat types when compared to the Proposed Development alone.

6.387 Species being considered for the wind farms comprise bats, breeding birds, dormice, otter, and reptiles. Potential impacts on a number of these species from the wind farm will be avoided through design, with commitments to mitigate where effects are unavoidable. The upland landscape will be largely associated with different species assemblages from the proposed solar park with significant differences in landscape and context, but there will be some overlap with ground nesting bird species and potentially some reptile species.

6.388 The two wind farms and solar farm lie outside the zone of influence of the proposed solar park for individual species with no direct connectivity with the Proposed Development. The local populations within the site would not be expected to have negligible interaction with the populations present within the other proposals.

6.389 Habitat loss in the wind farm sites will be very localised and development of the solar park would incorporate the protection of field boundaries.

- 6.390 All three proposed developments in the wider area will need to deliver biodiversity enhancement to meet planning obligations. Maintaining the conservation status of S7 species, other species of conservation importance and legally protected species should form part of the individual plans for these developments.
- 6.391 There would be no increase in significance of effects on habitats or species (i.e. cumulative effects with all of the listed developments) when compared to the Proposed Development alone.

Inter-relationships

- 6.392 In identifying and assessing the effects of the Proposed Development on terrestrial ecology, the inter-relationships with the environmental effects identified in other ES chapters has been considered.
- 6.393 The information set out in Chapter 2: Project Description has provided the basic information upon which to base the assessment of the effects of the Proposed Development as a result of land take, operation and construction.
- 6.394 There are inter-relationships between the ecology assessment and the landscape assessment and strategy (Chapter 5 and Figure 5.65), hydrological aspects of design (see separate Flood Consequences Assessment) and the construction programme. The Proposed Development has evolved with input from each of the technical disciplines to inform the site layout and landscape strategy. The output from the collaborative design is described in the built-in mitigation section and considered in the assessment of impacts and effects.

Summary of Effects

- 6.395 **Table 6.6** presents a summary of effects on ecological resources for the construction and operational phases. There is no potential for impacts on any statutory designated sites.
- 6.396 The eastern boundary of the site and a short section of the northern boundary area adjoin a non-statutory designated site, The Willowford SINC and there is a hydrological connection with Tonteg Marsh SINC. The consistent implementation of environmentally sensitively construction methods, including pollution prevention, would avoid the potential for any adverse effects on these SINCS.
- 6.397 Many of the key habitats are being retained and protected within the site including the hedgerow network, mature trees, ponds, ditches, and boundary watercourses.
- 6.398 Habitats of low value (important in a local context) include marsh/marshy grassland which comprises a large area of species-poor marsh growing on a deep layer of underlying peat, a small area of sharp-flowered rush grassland with multiple positive indicator species and more localised areas of marsh/marshy grassland with some associated with shallow peat. These features are classified as having low sensitivity/value under the EIA criteria for assessment, equating to importance in a local context only.
- 6.399 The species/species groups that utilise habitats within the site have been evaluated as mostly low value (importance at a site or local context) derived from survey findings and precautionary assumptions of presence. The assemblage of birds breeding within and adjacent to the site, is classified as of low - medium sensitivity equating to importance in a local or possibly district context, with a barn owl hunting territory overlapping the site. Adder has been recorded on site with the habitats also having the potential to support grass snake, slow worm and common lizard.
- 6.400 Surveys have confirmed the very likely absence of great crested newt, and water vole and there is no evidence of otter activity.
- 6.401 Direct habitat loss will be limited to the access track, small-scale infrastructure and the supports for each panel. During construction the predominately short impacts on grassland habitats have been classified as negligible adverse.

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- 6.402 Construction activities have the potential to have an effect of minor adverse significance on breeding birds. The predicted construction impacts on all other species/species groups are almost all short term and have been classified as effects of negligible adverse significance (effects of relevance in the context of the site) or no change.
- 6.403 During the operational phase the changes to habitats and species will relate to the partial shading by solar panels and the changes in management with areas currently subject to cutting regimes becoming grazed.
- 6.404 Management of the field boundaries will be designed to safeguard the value of higher value features over the lifetime of the development and enhance areas of lower diversity/value for fauna. Management objectives will specifically create variation designed to benefit a wide range of fauna species including areas of flower-rich grassland.
- 6.405 Selected areas in the north-western part of the site will become a Biodiversity Enhancement Area comprising the area of deep peat and most species-rich areas of marshy grassland.
- 6.406 The significance of the effect is predicted to be beneficial at a site level for higher value marshy grassland and hedgerows and trees, to no change for broadleaved woodland or ponds. Effects that adverse but significant in the context of the site only relate to grassland fields that are currently subject to cutting management regimes which will be sheep grazed following the installation of the Proposed Development.
- 6.407 For fauna species effects are predicted to be beneficial in the context of the site or result in no change as a result of targeted habitat protection, management and enhancement.
- 6.408 None of the adverse or beneficial effects identified during construction and operation are significant in EIA terms.

Table 6.6 Summary of Likely Environmental Effects on Ecology and Nature Conservation

Receptor	Sensitivity of receptor	Description of impact	Short / medium / long term	Magnitude of impact	Significance of effect	Significant / Not significant
Construction phase						
Designated Sites						
Cardiff Beech Woods SAC	Very High (International)	None	n/a	No change	No change	Not significant
Severn Estuary SPA, SAC and Ramsar	Very High (International)	None	n/a	No change	No change	Not significant
Non-statutory designated sites						
The Willowford SINC	Medium (County)	Indirect disturbance	Short term	No change	No change	Not significant
Tonteg Marsh SINC	Medium (County)	Hydrological connection	Short term	No change	No change	Not significant
River Taff	Medium (County)	Very distant hydrological connectivity	Short term	No change	No change	Not significant
Other non-statutory designated sites	Medium (County)	None	n/a	No change	No change	Not significant
Habitats						
Poor semi-improved grassland	Negligible (Site)	Negligible	Short term	Negligible (adverse)	No change	Not significant
Semi-improved neutral grassland including soft rush pasture;	Low (Site)	Negligible	Short term	Negligible (adverse)	Negligible (adverse)	Not significant
Semi-improved acid grassland	Low (Site)	Negligible	Short term	Negligible (adverse)	Negligible (adverse)	Not significant
Marsh / Purple moor grass / Sharp flowered rush	Low / Medium (Local)	Negligible	Short term	Negligible (adverse)	Negligible (adverse)	Not significant
Hedgerows and mature trees	Low (Local)	Working in proximity to hedgerows and RPAs	Short term	No change	No change	Not significant

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Receptor	Sensitivity of receptor	Description of impact	Short / medium / long term	Magnitude of impact	Significance of effect	Significant / Not significant
Ponds, ditches watercourses	Low (Local)	Solar panel installation 10-20m from P3 and P1	Short term	Negligible (adverse)	Negligible (adverse)	Not significant
Broadleaved woodland	Low (Site)	Working in proximity to woodland edge habitat	Short term	No change	No change	Not significant
Species						
Bat – Roosts	Negligible to medium (Site to County)	Increase in noise during construction	Short term	No change	No change	Not significant
Bats - Foraging	Low (Site)	Working in proximity to hedgerows and trees	Short term	No change	No change	Not significant
Dormouse	Up to Low (Local)	Working in proximity to hedgerows and trees	Short term	No change	No change	Not significant
Badger	Negligible (Site)	Construction activities potentially in territory of a social group	Short term	No change	No change	Not significant
Hedgehog	Up to low (Site)	Potential disturbance of habitat	Short term	No change	No change	Not significant
Breeding birds	Low to medium (Local / District)	Impacts on active nests in spring/summer; reduction in foraging habitat	Short term	Medium (adverse)	Minor (adverse)	Not significant
Wintering Birds	Low (Local)	Behavioural changes due to construction activities in winter	Short term	Low (adverse)	Negligible (adverse)	Not significant
Reptiles	Low (Local)	Habitat disturbance associated with solar panel installation	Short	Low (adverse)	Negligible (adverse)	Not significant
Invertebrates	Low (Site)	Localised habitat loss	Long	Negligible (adverse)	Negligible (adverse)	Not significant
Invasive plant species	None	Potential spread during construction	Medium / Long	Negligible (adverse)	Negligible (adverse)	Not significant
Operational phase						
Designated Sites						

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Receptor	Sensitivity of receptor	Description of impact	Short / medium / long term	Magnitude of impact	Significance of effect	Significant / Not significant
Cardiff Beech Woods SAC	Very High (International)	None	n/a	No change	No change	Not significant
Severn Estuary SPA, SAC and Ramsar	Very High (International)	None	n/a	No change	No change	Not significant
Non-statutory designated sites						
The Willowford SINC	Medium (County)	Indirect disturbance; changes to grazing	Long term	No change / negligible positive	No change / negligible beneficial	Not significant
Tonteg Marsh SINC	Medium (County)	None	n/a	No change	No change	Not significant
River Taff	Medium (County)	None	n/a	No change	No change	Not significant
Other non-statutory designated sites	Medium (County)	None	n/a	No change	No change	Not significant
Habitats						
Poor semi-improved grassland	Negligible (Site)	Partial shading	Long term	No change	No change	Not significant
Semi-improved neutral grassland with soft rush	Low (Site)	Partial shading and changes in grassland management	Long term	Low (adverse)	Negligible (adverse)	Not significant
Semi-improved neutral grassland – hay management	Low (Site)	Partial shading and changes in grassland management	Long term	Low (adverse)	Negligible (adverse)	Not significant
Semi-improved acid grassland	Low (Site)	Partial shading and changes in grassland management	Long term	Negligible (positive)	Negligible (beneficial)	Not significant
Marsh (soft rush) / Deep Peat	Low (Local)	Habitat protection and management	Long term	Negligible / Low (positive)	Up to minor (beneficial)	Not significant
Purple moor grass / Sharp flowered rush	Low / Medium (Local)	Habitat protection and management	Long term	Negligible / Low (positive)	Up to minor (beneficial)	Not significant
Hedgerows and mature trees	Low (Local)	Increased connectivity	Long term	Negligible (positive)	Negligible (beneficial)	Not significant
Ponds, ditches and watercourses	Low (Local)	No change	n/a	No change	No change	Not significant

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Receptor	Sensitivity of receptor	Description of impact	Short / medium / long term	Magnitude of impact	Significance of effect	Significant / Not significant
Broadleaved woodland	Low (Site)	No change	n/a	No change	No change	Not significant
Species						
Bat – Roosts	Negligible to medium (Site to County)	Protection of context of mature trees; additional roost features	Long term	Negligible (positive)	Negligible (beneficial)	Not significant
Bats - Foraging	Low (Site)	Change in context of retained habitats	Long term	No change	No change	Not significant
Dormouse	Up to Low (Local)	Improved habitat connectivity; maintain food abundance	Long term	Negligible (positive)	Negligible (beneficial)	Not significant
Badger	Negligible (Site)	Change in context of retained habitats	Long term	No change	No change	Not significant
Hedgehog	Up to low (Site)	Change in context of retained habitats	Long term	No change	No change	Not significant
Breeding birds	Low to medium (Local / District)	Grassland management regime (ground nesting birds); field boundary management (tree pipit, willow warbler); reduced hunting area (barn owl)	Long term	Negligible (positive)	Negligible (beneficial)	Not significant
Wintering Birds	Low (Local)	Change in context of foraging habitat; additional winter food provision	Long term	No change / Negligible (positive)	No change / Negligible (beneficial)	Not significant
Reptiles	Low (Local)	Grazing and partial shading of fields; habitat management with range of different objectives;	Long term	Negligible (positive)	Negligible (beneficial)	Not significant
Invertebrates	Low (Site)	Increasing the structural diversity of field boundaries	Long term	Negligible (positive)	Negligible (beneficial)	Not significant
Invasive plant species	None	Control of spread and eradication from site;	Long term	Low (positive)	Minor (beneficial)	Not significant

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