Preliminary Environmental Information Report

Chapter 8: Ecology

PEIR Chapters [PINS Ref: EN 010171

Document Reference: EN 010171/PEIR CHP/8

Revision Number: 1

December 2025

Future Energy Llanwern Limited

Contents

8.0 Ecology

8.1 Introduction

8.1.1 This Chapter reports the outcome of the preliminary assessment of likely significant effects arising from the Proposed Development upon ecology and biodiversity.

8.1.2 It assesses the following potentially significant effects:

- Direct effects including land take/ habitat loss, dewatering, direct disturbance (such as removal of nesting/ roosting sites), fragmentation where the impact includes severance of habitats and/or wildlife corridors linking them, which may lead to reduced genetic diversity and increase the likelihood of species being lost, and killing/ injury of species.
- Indirect impacts including disturbance, which may include visual, noise or vibration, pollution and dust deposition, lighting, increase in traffic movements, water discharges and surface runoff which may affect habitats/ species both within and outside the footprint of the development, or habitat degradation (e.g. via shading or management) which can affect conservation status.

8.1.3 Effects are considered during construction, operation and decommissioning phases, covering the lifetime of the Proposed Development.

8.1.4 The preliminary assessment is based on information obtained to date. This Chapter (and its associated figures and appendices) is intended to be read as part of the wider Preliminary Environmental Information Report (PEIR), with particular reference to;

- **Chapter 2: Description of the Proposed Development**;
- **Chapter 9: Ornithology**;
- **Chapter 10: Water Environment**;
- **Chapter 13: Noise and Vibration**; **and**
- **Chapter 15: Transport and Access**.

8.1.5 This Chapter describes:

- the legislation, planning policy and other documentation that has informed the assessment (**Section 8.2**);
- limitations and assumptions (**Section 8.3**);
- Stakeholder engagement: the outcome of consultation and engagement that has been undertaken to date, including how matters relating to terrestrial ecology and nature conservation within the Scoping Opinion received in January 2025 will be addressed (**Section 8.4**)**;**
- the methods used for the baseline data gathering and the scope of the assessment for ecology and nature conservation (excluding ornithology which is covered in **Chapter 9**) (**Section 8.5**);
- a description of significance criteria (**Section 8.6**);
- the overall baseline as it currently stands (**Section 8.7**);
- embedded environmental measures relevant to ecology and nature conservation (**Section 8.8**);
- a preliminary assessment of likely impacts and effects during construction, operation and decommissioning based on information available to date (**Section 8.9**)
- Consideration for the potential mitigation and enhancement measures to reduce the impact of the Proposed Development (**Section 8.10**);
- The application of the Step-wise Approach (**Section 8.11**)
- a summary of residual effects for ecology and nature conservation (**Section 8.12**
- consideration of cumulative effects (**Section 8.13**);
- an outline of further work to be undertaken for the Environmental Statement (ES) (**Section 8.14**);
- A summary (**Section 8.15**)**;** and
- References (**Section 8.16**).

8.1.6 The appendices in **Table 8-1** below also accompany this assessment.

Table 8-1 - Appendices which have informed the ecology assessment

Drawing number / Document reference	Description
Appendix 8A	Desk Study
Appendix 8B	Extended Phase 1 Habitat Survey

Appendix 8C	NVC Survey
Appendix 8D	Great Crested Newt Survey
Appendix 8E	Bat Surveys
Appendix 8F	Dormouse Surveys
Appendix 8G	Invertebrate Surveys
Appendix 8H	Riparian Mammal Surveys
Appendix 8I	Shadow Habitat Regulations Assessment (sHRA)
Appendix 8J	Outline Landscape and Ecological Management Plan (oLEMP)

8.2 Legislation and Planning Policy

Legislative Framework

8.2.1 The ecology assessment has been prepared in accordance with the legislation and policy presented in **Table 8-2**.

Table 8-2 - Legislation and policy relevant to ecology

Policy/ Legislation	Context
The Habitats Directive 92/43/EEC (Ref 8-1)	The Habitats Directive is a European Union directive aimed at conserving natural habitats and wild fauna and flora by requiring member states to protect certain species and habitats of high conservation importance. The overall objective is to ensure that these species and habitat types are maintained, or restored, to a favourable conservation status within the EU. Key aspects include the creation of a network of protected sites called Natura 2000, which includes Special Areas of Conservation (SACs), and the strict protection of specific species, with a focus on maintaining or restoring them to a favourable conservation status. The Habitats Directive, was transposed in the UK by the Habitats Regulations 1994 (as amended) (now the Conservation of Habitats and Species Regulations 2017 (as amended).
The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 8-2)	The Conservation of Habitats and Species Regulations 2017 (as amended) constitute the UK Government's implementation of the European Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (often referred to as the 'Habitats Directive') in England and Wales. Changes were made by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 to transfer functions from the European Commission to the appropriate authorities in England and Wales.

The Regulations provide for the designation of both Special Protection Areas (SPA) (first established under Council Directive 79/409/EEC on the conservation of wild birds, often referred to as the 'Birds Directive') and Special Areas for Conservation (SAC) as part of the Natura 2000 network of protected areas across the European Union. The 2019 amendment includes the following changes:

- the creation of a National Site Network (NSN) within the UK territory comprising the protected sites already designated under the Nature Directives (comprising the Habitats Directive 92/43/ECC and the Birds Directive 79/409/EEC), and any further sites designated under these Regulations
- the establishment of management objectives for the national site network (the 'network objectives')
- a duty for appropriate authorities to manage and where necessary adapt the national site network as a whole to achieve the network objectives
- an amended process for the designation of Special Areas of Conservation (SACs)
- arrangements for reporting on the implementation of the Regulations, given that the UK no longer provides reports to the European Commission
- arrangements replacing the European Commission's functions with regard to the imperative reasons of overriding public interest (IROPI) test where a plan or project affects a priority habitat or species
- arrangements for amending the schedules to the Habitats and Species Regulations 2017 (as amended) and the annexes to the Nature Directives that apply to the UK

The Regulations also place a requirement for 'Appropriate Assessment' to be undertaken of plans and proposals likely to affect those sites.

For European Protected Species (EPS), the Regulations give protection from deliberate capture, killing or disturbance (where disturbance; affects the ability of the EPS to survive, breed or reproduce, to rear or nurture their young, to hibernate or migrate; or significantly affects the local distribution or abundance of the EPS) of animals listed in Schedule 2. Schedule 2 species are:

- Horseshoe bats (all species)
- Typical bats (all species)
- Eurasian beaver
- Large blue butterfly
- Wild cat

	• Dolphins, porpoises and whales (all species) • Dormouse • Pool frog • Sand lizard • Fisher's estuarine moth • Great crested newt • Otter • Lesser whirlpool ram's-horn snail • Smooth snake • Sturgeon • Natterjack toad • Marine turtles It is also an absolute offence to destroy or damage the resting place or breeding site of an EPS. The Regulations ensure that activities that will impact upon an EPS or its habitat cannot be undertaken unless authorised by a Mitigation Licence issued by NRW. Such a licence is granted until after planning consent has been obtained and once NRW are satisfied that adequate measures are to be put in place to mitigate for the impact of the development.
Wildlife and Countryside Act 1981 (as amended) (Ref 8-3)	The Wildlife and Countryside Act 1981 (the "Act") and subsequent amendments, as strengthened by the Countryside and Rights of Way Act 2000, is the principal legislative mechanism for the protection of wildlife in Great Britain. It implements the Convention on the Conservation of European Wildlife and Natural Habitats (The Bern Convention) and EC Directive 2009/147/EC on the conservation of wild birds 'The Birds Directive'. The Act established a statutory framework for the protection of wildlife. It provides for the designation of Sites of Special Scientific Interest (SSSI), which are selected as the best national examples of habitat types, sites with notable species and sites of geological importance. Schedules 1-4 of the Act (as amended) deal with the protection of wild birds, making it an offence (subject to exceptions) to intentionally kill, injure or take any wild bird or their eggs or nests. Bird species listed on Schedule 1 have additional protection to prevent disturbance of these birds at their nests or the disturbance of their dependent young. Schedule 5 of the Act details protection of certain animal species. Full protection is given under Section 9 to some animals listed in Schedule 5 , such as water vole. Partial protection under Section 9 is given to certain other species, including all common species of reptile and EPS such as

	bats (which receive the majority of their protection under the Conservation of Habitats and Species Regulations 2017). • Schedule 8 of the Act details protection for plants • Schedule 9 Section 14(2) of the Act makes it an offence to cause any species of plant listed in Part II of Schedule 9 of the Act to grow in the wild (e.g. Japanese knotweed and Himalayan Balsam).
The Protection of Badgers Act 1992 (Ref 8-4)	Badgers are protected by the Protection of Badgers Act 1992 which makes it an offence to wilfully take, kill, injure or ill-treat a badger; to obstruct, destroy, or damage in any part, a badger's sett; or to disturb badgers within a sett.
Environment (Wales) Act 2016 (Ref 8-5)	Part 1 – Section 6 of the Environment (Wales) Act 2016 sets out requirements and duties for the Welsh Government and other public authorities to maintain and enhance biodiversity and promote the resilience of ecosystems. The duty places biodiversity as a natural and integral part of policy and decision making within public authorities. The Policies are designed to: • Maintain and enhance the natural environment through managing land appropriately to create healthy functioning ecosystems; • Increase awareness of the importance of a biodiverse natural environment with healthy functioning ecosystems; • Support ecological resilience, making the environment healthier for wildlife and people; and • Be adaptive to a changing environment where there is a need to use resources efficiently.
Future Wales: The National Plan 2040 (Ref 8-6)	The National Plan 2040 is Wales's National Development Framework (NDF), setting the direction for development in Wales to 2040. It is a development plan with a strategy for addressing key national priorities through the planning system. Policy 9 (Resilient Ecological Networks and Green Infrastructure) focuses on enhancing biodiversity and resilience of ecosystems, urging safeguarding and creation of ecological networks and maximising green infrastructure through nature-based solutions.
Planning Policy Wales (Ref 8-7)	Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. The primary objective of PPW is to ensure that the

	planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation and resultant duties. Noteworthy policies relating to ecology and biodiversity are as follows: • Green Infrastructure – an emphasis is placed on taking a proactive approach to green infrastructure including cross-boundary considerations; • Net Benefit for Biodiversity and the Step-wise Approach - a strong focus is placed on securing a net benefit for biodiversity through the application of the step-wise approach utilising the DECCA framework (Diversity, Extent, Condition, Connectivity and Aspects of ecosystem resilience), including the acknowledgement of off-site compensation measures as a last resort, and the need to consider enhancement and long-term management at each step; • Non-statutory designations - Sites of Importance for Nature Conservation, Local Wildlife Sites, Local Nature Reserves, and Regionally Important Geodiversity Sites make a vital contribution to delivering an ecological network for biodiversity and resilient ecosystems, and they should be given protection in development plans and the development management process; and • Protected species- The presence of a species protected under European or UK legislation, or under Section 7 of the Environment (Wales) Act 2016 is a material consideration in the planning process and it is considered best practice that screening to determine the presence of protected species should be carried out by a competent ecologist on the basis of data provided by the relevant Local Environmental Record Centre.
Technical Advice Note (TAN) 5: Nature Conservation and Planning (Ref 8-8)	Technical Advice Note 5 (TAN 5) provides advice on how the land use planning system should aid in the protection and enhancement of biodiversity and geological conservation. TAN 5 includes a five point approach to decision making of "information, avoidance, mitigation, compensation and new benefits." This means that potential harm to biodiversity should first be avoided wherever possible. If avoidance is not feasible, steps should be taken to mitigate any adverse

	impacts. Finally, any residual impacts should be addressed through compensation to ensure no net loss of biodiversity.
Monmouthshire Local planning policy - Monmouthshire County Council Local Development Plan (LDP) 2011-2021 or its successor (currently in preparation) (Ref 8-9)	The policy of most relevance is Policy SD1 (*Renewable Energy)*. The policy states that *"renewable energy schemes will be permitted where….there are no unacceptable adverse impacts on biodiversity."*
Newport Local planning policy – Newport Local Development Plan (LDP) 2011- 2026 (Ref 8-10)	The policy of most relevance is Policy GP5 (General Development Principles – Natural Environment). The policy lists the criteria that development must comply with in order to be permitted. This criteria relates to the design and management of proposals to ensure the protection of biodiversity and ecological connectivity and how the proposals address impacts (avoid, mitigate, compensate) on biodiversity. The policy also states that proposals should not result in in unacceptable impacts on water quality, landscape quality or the loss or reduction of high quality agricultural land. The policy states that proposals should be accompanied by a landscape scheme and should include appropriate tree planting or retention as required. The proposals should not *"result in the unacceptable loss of or harm to trees, woodland or hedgerows that have wildlife or amenity value."*
Overarching National Policy Statement (NPS) for Energy (EN-1), specifically in relation to Section 4.6 Environmental and Biodiversity Net Gain and Section 5.4 Biodiversity and Geological Conservation (Ref 8-11)	NPS EN-1 sets out national policy for delivery of major energy infrastructure, which includes renewable electricity generation. Section 4.6 relates to Environmental and Biodiversity Net Gain. The section states that projects should "*not only avoid, mitigate and compensate harms, following the mitigation hierarchy, but also consider whether there are opportunities for enhancements".* The section goes on to state that *"in Wales, Net Benefit for Biodiversity is based on the concept that development should leave biodiversity and the resilience of ecosystems in a better state than before, through securing long-term, measurable and demonstrable benefit, primarily on or immediately adjacent to the site."* *Section 5 states that "development on land within or outside a SSSI, and which is likely to have an adverse effect on it*

	(either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits (including need) of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSSIs".
National Policy Statement for Renewable Energy Infrastructure (EN-3) (Ref 8-12)	NPS EN-3 states that *"Applicants need to consider environmental and biodiversity net gain as set out in Section 4.5 of EN-1 and the Environment Act 2021. Applicants should assess the potential of their proposed development to have net positive effects on marine ecology and biodiversity, as well as negative effects."*
National Policy Statement for Electrics Networks Infrastructure (EN-5) (Ref 8-13)	NPS EN-5 sets out the government's policies for developing nationally significant electricity networks. It includes Biodiversity and Geological Conservation, in particular feeding and hunting grounds, migration corridors and breeding grounds, where they are functionally linked to sites designated or allocated under the 'national site network' provisions of the Conservation of Habitats and Species Regulations. The applicant should consider and address routing and avoidance/ minimisation of environmental impacts both onshore and offshore at an early stage in the development process
Environment Act 2021 (Ref 8-14)	The Environment Act 2021 is the UK's post-Brexit framework for environmental protection, establishing a system of long-term targets for improving air quality, water, biodiversity, and waste reduction. While Wales has adopted some provisions from the UK Environment Act 2021 through commencement regulations, its own legislation aims to provide a more direct framework for Welsh environmental policy, including targets and governance structures.

Technical Guidance Relevant to Ecology

8.2.2 The ecology assessment has been prepared in accordance with the following guidance and standards as presented in **Table 8-3**.

Table 8-3 - Guidance and standards relevant to ecology

Technical Guidance	Context
Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact	The guidance provides *"practical advice for all professionals involved with ecological evaluation and assessment for proposed developments in terrestrial, freshwater, marine and coastal environments"* and

Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3 (CIEEM, 2018, updated in 2024) (Ref 8-15)	sets out the methodology for assessing ecological effects.
Local Biodiversity Action Plans (BAP), including The Greater Gwent Nature Recovery Action Plan (undated) and Newport City Council's Local BAP (undated) (Ref 8-16 and Ref 8-17)	The Greater Gwent Nature Recovery Action Plan is a strategic document, set in the context of national and regional legislation and policy drivers, aiming to halt and reverse negative biodiversity trends identified in both the State of Natural Resources Report and the Greater Gwent State of Nature Report. It provides guidance and recommendations on nature recovery actions within the Greater Gwent Area, allowing all stakeholders to work collaboratively to halt biodiversity decline and promote the recovery of nature across Greater Gwent. The Newport BAP provides a list of seven species and seven habitats which are priorities for conservation in the region.
Biodiversity and Ecosystem Resilience Forward Plans for Monmouthshire and Newport (Ref 8-18)	The plan is a proactive initiative which aims to maintain and enhance biodiversity and promote ecosystem resilience. The plan is part of a wider commitment *"to address the climate and nature emergency."*
British Standard BS42020: Biodiversity - Code of Practice for Planning and Development (Ref 8-19)	The BS42020 "*gives recommendations and provides guidance primarily for ensuring that actions and decisions taken at each stage of the planning process are informed by sufficient and appropriate ecological information.*"
BRE (2014) National Solar Centre Biodiversity Guidance for Solar Developments (Ref 8-20)	The guidance "*provides guidance to planners and the solar industry on how they can support biodiversity on solar farms.*"

8.3 Assessment Assumptions and Limitations

8.3.1 To ensure transparency within the Environmental Impact Assessment (EIA) process, the following limitations and assumptions have been identified:

- The findings will be based upon available information and field survey findings at the time. As with any surveys of this kind, the information collected is not intended to be a record of every species present.

- Due to the presence of livestock at the time of survey, static bat monitoring devices have not been located in areas of open grassland. However, information on bat activity within grassland locations has been obtained through transect surveys and will be reported within the technical appendices of the Environmental Statement (ES) chapter.

- Identification of bat calls to species level is not always possible due to a variety of factors. In particular there is considerable overlap between echolocation calls of bat species in the Myotis genus. As such, recordings of Myotis during static monitoring survey have been identified to genus level only for the purpose of this study.

- Some surveys did not fully cover fields due to the presence of livestock including calves at foot. It is considered that sufficient data has been gathered across remaining fields to infer any results from inaccessible locations to inform the forthcoming assessment and any mitigation measures.

- Surveys for reptiles have not been undertaken, however given the habitats present and the current land use, a typical population of widespread species is assumed present. Suitable mitigation and compensation can be designed, without significant adverse impacts on the population.

8.4 Stakeholder Engagement

8.4.1 **Table 8-4** provides a summary of the consultation activities undertaken in support of the preparation of this assessment.

Table 8-4 - Summary of consultation undertaken

Body/organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
Natural Resources Wales (NRW)	Non-statutory pre-application advice 2nd July and meeting on 14th August 2024.	The purpose of this was to seek agreement as to how best to establish baseline conditions for the SSSI(s) across the EIA Scoping Red Line Boundary and the preferred management regime for the area; To seek agreement on the scope of proposed ecology survey work to support the application; and To request confirmation as to whether the creation of new ditch habitat would be welcomed. Official feedback was provided in the discretionary planning advice response as detailed below.
Natural Resources Wales (NRW)	Discretionary planning advice response provided 27 September 2024 (ref: CAS-264330-X0X8).	Provision of 2010 -13 NRW Gwent Levels reports and tables of reen monitoring from 2017 – 2023. The letter provided recommendations that: • detailed surveys for the fields with the greatest floral biodiversity is undertaken and that these fields are avoided for development with panels. • Fields with grips should be highlighted. • Positive management / enhancement of fields and ditches across the site should commence prior to construction so that mitigation fields are establishing at an early stage. • Connectivity between botanically diverse areas and those supporting shrill carder bee (SCB) will be important. • Nutrient testing of fields that are proposed to be enhanced for pollinators should be undertaken to check whether wildflower establishment is likely.

	• The survey for shrill carder bee (SCB) should be comprehensive with thorough survey of field margins which can support bees even when the field is more improved. The survey data should include identification of the food plant the bee is foraging on. Areas to support nesting SCB should be identified and mapped. • There must be adequate consideration of functionally linked land that supports features of River Usk and Severn Estuary Special Area of Conservation (SAC), SPA and Ramsar site, given the sensitivity of the features. • We advise that surveys over 2 years old are updated and that the impact assessment is based on up to date surveys. • Various recommendations regarding the LEMP were provided including hay cuts, ditch management and herbicide use.

8.4.2 An EIA Scoping Report (**Appendix 1A**) for the Proposed Development was submitted in December 2024, **Table 8-5** presents a summary of comments provided by the Planning Inspectorate and consultees as part of the scoping process and the Applicant's response, highlighting where relevant how these comments have been addressed within this Chapter.

Table 8-5 - Main Matters Raised during Consultation

Consultee	Main matter raised	How has the concern been addressed	Location of response
Planning Inspectorate	Impacts to Severn Estuary Ramsar/ Special Area of Conservation (SAC)/Site of Special Scientific Interest (SSSI) - operation The Scoping Report proposes to scope this matter out on the basis that there are limited potential effects associated with the operation of the proposed development. It is noted that the Scoping Report does not consider the potential for impacts through the degradation of water quality as a result of changes to the local drainage regime or spillage due to the presence of solar PV panels. Therefore, the Inspectorate considers that insufficient information has been provided on the potential for operational effects on this site. The ES should assess the potential impacts to the Severn Estuary Ramsar/ SAC/ SSSI during operation.	This has been scoped in and addressed in **Section 8.6** and the Shadow Habitat Regulation Assessment (**Appendix 8I**).	**Section 8.9** and **Appendix 8I**
Planning Inspectorate	Impacts to River Usk SAC - construction and operation. The Scoping Report proposes to scope this matter out on the basis that the proposed development is sufficient distance from the site to avoid significant effects. The Inspectorate considers that there is still the potential for impacts to occur on the SAC from 3.7km. Furthermore, insufficient evidence has been provided to rule out the possibility of impacts occurring. The Inspectorate also notes that	This has been scoped in and addressed in **Section 8.6** and the Shadow Habitat Regulation Assessment (**Appendix 8I**).	**Section 8.9** and **Appendix 8I**

Consultee	Main matter raised	How has the concern been addressed	Location of response
	some of the habitat on site such as reens and ditches may have some functional linkage to the SAC. As such, the Inspectorate is not in a position to scope this matter out. The ES should assess the impacts to the River Usk SAC. The applicant's attention is drawn to the consultation response from National Resources Wales (NRW) for further information.		
Planning Inspectorate	Impacts to Wye Valley and Forest of Dean Bat Sites SAC – construction and operation. This matter is proposed to be scoped out on the basis that the proposed development lies outside the '*sensitive locations'* detailed within the Wye Valley and Forest of Dean Bat SAC: Development Management – Horseshoe Bat activity survey and assessment guidance (2021), is located 9.5km away from the SAC and outside of the core sustenance area for horseshoe bats. On this basis, the Inspectorate agrees that significant effects are unlikely to occur on this site. This matter can be scoped out from the ES.	N/A	N/A
Planning Inspectorate	Impacts to Magor Marsh SSSI – construction and operation. This matter is proposed to be scoped out on the basis that the SSSI is located 1.2km away and is upstream from the proposed development. The Inspectorate considers that there is still the potential for upstream impacts to occur on the	This has been scoped into **Section 8.9**. Hydrological connectivity will be assessed in the **Chapter 10 Water Environment**.	**Section 8.9** and **Chapter 10 Water Environment**

Consultee	Main matter raised	How has the concern been addressed	Location of response
	SSSI from 1.2km. Furthermore, insufficient evidence has been provided to rule out the possibility of impacts occurring. As such, the Inspectorate is not in a position to scope this matter out entirely. The ES should provide a statement detailing how significant effects are unlikely to occur, including reference to all potential impact pathways. If any potentially significant effects are identified, these should be fully assessed within the ES.		
Planning Inspectorate	Impacts to Newport Wetlands SSSI/ NNR – construction and operation. This matter is proposed to be scoped out on the basis that the SSSI is located 1.2km away from the proposed development. The Inspectorate considers that there is still the potential for impacts to occur on the SSSI from 1.2km. Furthermore, insufficient evidence has been provided to rule out the possibility of impacts occurring. As such, the Inspectorate is not in a position to scope this matter out entirely. The ES should provide a statement detailing how significant effects are unlikely to occur on this site, including reference to all potential impact pathways, including for example any hydrological pathways. If any potentially significant effects are identified, these should be fully assessed within the ES.	This has been scoped into **Section 8.9**. Hydrological connectivity will be assessed in the **Chapter 10 Water Environment**.	**Section 8.9** and **Chapter 10 Water Environment**.
Planning Inspectorate	Impacts on:	N/A	N/A

Consultee	Main matter raised	How has the concern been addressed	Location of response
	• Roosting Bats • Dormice • Water Voles and; • Harvest Mice - during operational phase only. Impacts to these species are proposed to be scoped out on the basis that trees with bat roost potential are to be retained, reen buffer zones are to be established and once the solar panels are erected, direct impacts to these species and habitats are unlikely to occur. The Inspectorate agrees that direct impacts to these species during the operation of the proposed development are unlikely to occur and can be scoped out of the ES.		
Planning Inspectorate	Baseline figures. The ES should provide separate figures detailing the areas where baseline surveys have been undertaken (and where coverage has been missed) and the current land uses of the site. The applicant's attention is drawn to the consultation response from Natural Resources Wales (NRW) for further information (Appendix 2 of this Opinion).	Figures are provided in the various technical appendices, detailing survey areas for each ecological feature surveyed.	• **Appendix 8A Desk Study** • **Appendix 8B Extended Phase 1 Habitat Survey** • **Appendix 8C NVC Survey** • **Appendix 8D Great Crested Newt Survey** • **Appendix 8E Bat Surveys**

Consultee	Main matter raised	How has the concern been addressed	Location of response
			• **Appendix 8F Dormouse Surveys** • **Appendix 8G Invertebrates Surveys** • **Appendix 8H Riparian Mammal Surveys.**
Planning Inspectorate	Baseline surveys. Previous baseline surveys carried out for the proposed development include a Phase 1 Habitat Survey carried out in 2019 and a UK Habitat Classification survey carried out in 2023. For the avoidance of doubt, any update to the 2019 survey should utilise the Phase 1 Habitat Survey methodology. The applicant's attention is drawn to the consultation response from NRW for further information (Appendix 2 of this Opinion).	Habitat surveys have been updated in 2025 and results supplied in the Phase 1 Habitat Survey methodology format (see **Appendix 8B**).	• **Appendix 8B Extended Phase 1 Habitat Survey**
Planning Inspectorate	Electromagnetic Fields (EMF). The Inspectorate notes the approach to watercourse cable crossings has not yet been agreed and that there is potential for trenchless construction techniques to be applied where appropriate. In the absence of further information, such as details on the final cabling method and route, the Inspectorate considers there is the potential for soil heating from cables	To be addressed in ES Chapter 17.	To be addressed in ES Chapter 17.

Consultee	Main matter raised	How has the concern been addressed	Location of response
	and EMF effects to occur to ecological receptors including those within watercourses such as fish. The ES should consider the potential for EMF effects to occur to ecological receptors including those within affected watercourses. The ES should also clarify the cabling method required to cross relevant watercourses and describe any design measures in place which would limit the potential for EMF effects.		
Monmouthshire County Council	Monitoring. The monitoring of the developments impact on the environment, habitats and species should be an integral element of the ES and development process. This should tie into the Landscape, GI and ecology sections and also consider the monitoring of cumulative impacts on the environment, habitats and species within the wider SSSI. Where negative impacts and decline of key species are recorded as a result of cumulative development to the detriment of the integrity of the SSSI and landscape character a clear plan of remedial action must be incorporated as part of the ES.	A monitoring strategy for ecological features will be produced as part of the Landscape and Ecological Management Plan (LEMP), an Outline LEMP (oLEMP) is provided as part of this PEIR (**Appendix 8J**)	**Appendix 8J**
Monmouthshire County Council	Where over 24 months have expired since the previous surveys were undertaken, update surveys will be expected to be submitted to inform the application unless sufficient justification can be provided.	Update surveys are underway where they are considered out of date and will inform the ES.	**Section 8.14**.
Monmouthshire County Council	Table 8-3 of the report details elements of the scheme that have been scoped in or out of the EIA. Operational impact to roosting bats and	No lighting is proposed during operation therefore this remains scoped out of the assessment.	**Section 8.9**.

Consultee	Main matter raised	How has the concern been addressed	Location of response
	dormice have been scoped out, although there could be potential for lighting to impact upon both species if it is not located appropriately and mitigation is not implemented. Furthermore, the potential loss of hedgerows could result in a loss and fragmentation of dormice habitat. Therefore, it is advised that these two components are scoped into the EIA.	Impacts on dormice due to hedgerow removal has been scoped in during construction and compensation will be provided as part of an European Protected Species (EPS) licence which will ensure connectivity is maintained during operation.	
Monmouthshire County Council	Furthermore, invertebrate features associated with the Newport Wetlands SSSI designation could be impacted at a population level by the proposals, and therefore this element should not be scoped out. It is agreed that habitat features of the designation will be unlikely to be impacted, whilst ornithological features will be considered in Chapter 9.	Newport Wetlands SSSI has now been scoped in.	**Section 8.9**
Newport City Council	Stepwise Approach to be followed; avoidance, minimise, mitigation/ restore, compensation and enhancement to be identified.	This has been included in **Section 8.11.**	**Section 8.11.**
Natural Resources Wakes	Any update to the 2019 survey of the site should utilise the Phase 1 Habitat Survey methodology or cross clarification be provided between the two methodologies for habitats present on site. If other further surveys are proposed, they should be undertaken in accordance with the JNCC Phase 1 survey guidelines (Handbook for Phase 1 habitat survey. JNCC, Peterborough 2010 Edition) (Ref 8-22) and should be undertaken and completed during the	Update surveys using the Phase 1 Habitat Survey have been undertaken in July 2025.	**Appendix 8B Extended Phase 1 Habitat Survey**

Consultee	Main matter raised	How has the concern been addressed	Location of response
	summer to ensure the best chance of identifying the habitats present.		
Natural Resources Wakes	Maps should be provided, detailing the extent of the site covered by each survey effort. We advise that the detail of surveys is submitted to confirm whether the extent of area covered by each is appropriate, to provide enough information about the existing habitat and species on site. This should be used to inform the design, layout and proposed mitigation.	Maps showing the survey area covered are provided in the relevant appendices.	• **Appendix 8A Desk Study** • **Appendix 8B Extended Phase 1 Habitat Survey** • **Appendix 8C NVC Survey** • **Appendix 8D Great Crested Newt Survey** • **Appendix 8E Bat Surveys** • **Appendix 8F Dormouse Surveys** • **Appendix 8G Invertebrates Surveys** • **Appendix 8H Riparian Mammal Surveys.**
Natural Resources Wakes	We disagree that an assessment within the ES of the impacts on the River Usk SAC located 3.7km away should be scoped out. We provide further detail in support of this point under the functionally linked land section below.	The River Usk has been scoped in, relating to water quality issues. The sHRA further discusses functionally linked land for otter.	**Section 8.9 and Appendix 8I Shadow HRA.**

Consultee	Main matter raised	How has the concern been addressed	Location of response
Natural Resources Wakes	The ES should fully consider the likely significant effects of the proposed development on the special interests the SSSIs are designated for.	The PEIR includes a preliminary assessment of effects on the SSSI.	**Section 8.9**
Natural Resources Wakes	We advise current land use information to be presented clearly on a map for each area/ field on site with additional information tabled if necessary. This should include for example which fields are arable, grazed by sheep or cattle, unmanaged or hay cut.	Habitat types are illustrated on Figure 8.2.2 within **Appendix 8.2: Extended Phase 1 Habitat Survey.** A description of each habitat is provided within Appendix 8.2.	**Appendix 8B: Extended Phase 1 Habitat Survey** and Figure 8.2.2 of the appendix.
Natural Resources Wakes	We note section 8.9.1 states: 'some surveys did not fully cover fields due to the presence of livestock including calves at foot. It is considered that sufficient data has been gathered across remaining fields to infer any results from inaccessible locations to inform the forthcoming assessment and any mitigation measures.' Full details of the surveys including which fields were not covered should be submitted.	All fields were assessed during daytime surveys (e.g. Extended Phase 1 Habitat Survey) during at least one of the surveys or update surveys. Where fields could not be accessed at night (e.g. during bat transects) this is noted in the relevant limitations section of the technical appendix.	• **Appendix 8A Desk Study** • **Appendix 8B Extended Phase 1 Habitat Survey** • **Appendix 8C NVC Survey** • **Appendix 8D Great Crested Newt Survey** • **Appendix 8E Bat Surveys** • **Appendix 8F Dormouse Surveys** • **Appendix 8G Invertebrates Surveys**

Consultee	Main matter raised	How has the concern been addressed	Location of response
			• **Appendix 8H Riparian Mammal Surveys.**
Natural Resources Wakes	Ditch and reen surveys of the site by the applicant should be clearly presented on a map with any details tabulated as this will inform requirements for a ditch management program in a Landscape Ecological Management Plan (LEMP) and which areas would be prioritised if permission is granted.	Ditch sampling locations are shown in **Figure 8.3.1** of **Appendix 8C: NVC Survey.**	**Figure 8.3.1** of **Appendix 8C: NVC Survey.**
Natural Resources Wakes	We note in section 8.4.8 that '*small numbers of semi-improved grassland and marshy grassland fields are present supporting a higher plant diversity*.' More detailed surveys than Phase 1 will likely be required for any fields where the greatest floral biodiversity is identified.	A more detailed botanical assessment was undertaken in July 2025. Detail is provided within **Appendix 8B: Extended Phase 1 Habitat Survey.**	**Appendix 8B: Extended Phase 1 Habitat Survey.**
Natural Resources Wakes	We welcome that surveys, as outlined in Table 8-2 Baseline Survey Methods, have been undertaken for invertebrates including shrill carder bees in 2020 and 2023. The forage plant of each sighting of shrill carder bee should be provided. These surveys should be across the extent of the site, as shrill carder bee may be using ditch and hedgerow margins in areas where the floral diversity away from field margins is low. Without a map, it is unclear from Table 8-2 whether the surveys of each sub-unit will be sufficient coverage of the site. The survey information should be used to inform any	Surveys covered the full extent of the site. A map is provided within **Appendix 8G Invertebrate Survey Results**.	**Appendix 8G Invertebrate Survey Results**.

Consultee	Main matter raised	How has the concern been addressed	Location of response
	mitigation plan for the site and design in habitat connectivity.		
Natural Resources Wakes	A LEMP should be designed using the survey information gained on site and include a clear schedule of when habitat management will be undertaken throughout construction and operation of the site.	An outline LEMP will be provided with the PEIR submission, with further detail provided as part of the ES.	**Appendix 8J Outline LEMP.**
Natural Resources Wakes	A ditch management program would increase the suitability of the watercourses to support the SSSI invertebrate features, so their diversity and abundance should increase on site and be retained during the lifetime of the project.	This will be included within the LEMP at the ES stage. An outline of management objectives is provided in the outline LEMP.	**Appendix 8J Outline LEMP.**
Natural Resources Wakes	NRW provided various advice on management including habitat management schedule, ditch management, creation of new ditches, grassland management for shrill carder bee, land management agreements and weed management by herbicides.	This will be included within the LEMP at the ES stage. An outline of management objectives is provided in the outline LEMP.	**Appendix 8J Outline LEMP.**
Natural Resources Wakes	We note there are fields proposed for development adjacent to the sea wall. Adequate consideration should be given of functionally linked land that supports features of River Usk and Severn Estuary SAC, SPA and Ramsar site, given the sensitivity of the features.	Functionally linked land is covered within **Appendix 8I Shadow HRA.**	**Appendix 8I Shadow HRA.**
Natural Resources Wakes	The site should be comprehensively assessed for its potential to support protected species such as great crested newts, dormice, bats, otters and water voles. Protected species surveys should be carried out by suitably qualified, experienced and where	Surveys for a range of protected species have been undertaken, with full details provided in the relevant appendices.	• **Appendix 8A Desk Study** • **Appendix 8B Extended Phase 1 Habitat Survey** • **Appendix 8C NVC Survey**

Consultee	Main matter raised	How has the concern been addressed	Location of response
	necessary, licensed surveyors in accordance with published best practice guidance, where this exists.		• **Appendix 8D Great Crested Newt Survey** • **Appendix 8E Bat Surveys** • **Appendix 8F Dormouse Surveys** • **Appendix 8G Invertebrates Surveys** • **Appendix 8H Riparian Mammal Surveys.**
Natural Resources Wakes	We note that surveys for great crested newt (GCN) have occurred at across three different years at various locations across the site. Only the 2023 data is considered indate currently. We advise that the planning application is supported by up to date surveys for the full application site. We advise the use of Habitat Suitability Index (HSI), eDNA and traditional survey techniques, with the latter used to confirm likely population sizes affected by the proposed development where GCN presence has been confirmed. It should be noted that HSI is principally designed to assess the suitability of habitat within ponds for GCN. Careful consideration will therefore have to be given as to how it can be applied to assess the suitability of habitat for GCN within reens and ditches across the	Updated eDNA and traditional surveys have been undertaken in 2025 to give a representative sample across the Study Area.	**Appendix 8D Great Crested Newt Survey**

Consultee	Main matter raised	How has the concern been addressed	Location of response
	application site, and the use justified. For all waterbodies within the application site, we advise that they are assessed for their functionality for GCN throughout all life cycle stages, including potential use for foraging and newt dispersal throughout the landscape and not just focusing on potential to support breeding GCN.		
Natural Resources Wakes	We note that dormouse surveys were carried out in 2023. These are still considered in date. Adequacy of the surveys will depend on the survey methodology employed and distribution of tubes across potential dormouse habitat. Where dormouse habitat is present across the site, we advise that the application includes descriptions of its condition/ favourability for the species. Surveys should follow the best practice guidance set out in: English Nature's Dormouse Conservation Handbook (2nd Ed)	As dormouse were found to be present, all hedgerow habitat is considered to have potential to support them. An assessment of impacts is included in **Section 8.9.**	**Section 8.9**
Natural Resources Wakes	We note that only one survey for riparian mammals (water voles and otters) has been carried out, in March 2024. Surveys for water voles should accord with the guidance in The Water Vole Mitigation Handbook (Dean et al, Mammal Society 2016). This advises two survey visits at least two months apart in the periods mid-April to end June and July/ September. Therefore, the 2024 survey does not accord with published best practice survey guidance for water voles; we advise that this is addressed.	Further surveys for riparian mammals will be undertaken in 2026, to inform the ES submission.	**Section 8.14**

Consultee	Main matter raised	How has the concern been addressed	Location of response
Natural Resources Wakes	*Tree Potential Roost Features* We note the reference to 2019 and 2021 datasets. Given the age of the datasets, the transient nature of tree roosts and the weathering that trees and their roosts are exposed to, we advise updated surveys of the application site are carried out in accordance with Bat Conservation Trust's 'Bat Surveys for Professional Ecologists. Good Practice Guidelines 4th Ed', published 2023. It is not acceptable to leave such surveys to the post-consent pre-construction phase.	Further surveys for tree roosts will be undertaken in 2026, to inform the ES submission.	**Section 8.14**
Natural Resources Wakes	We note that bat activity surveys were carried out between April-October in 2023, and it appears that these comprised monthly walked transects and automated detector surveys (in accordance with the 3rd Edition of the survey guidelines). These surveys are currently considered in-date. We advise that the project ecologist assesses the methodology employed for adequacy of approach, and the application includes the results of updated survey data (in accordance with the current guidelines) to address any gaps in the data/survey coverage.	Further surveys will be undertaken in 2026, to inform the ES submission, however it is considered that sufficient mitigation can be designed due to provision of large buffers around existing ditches and hedgerows.	**Section 8.14**

8.5 Assessment Methodology

Scope of the Assessment

8.5.1 This scope has been developed as the Proposed Development design has evolved through an ongoing scoping process and responds to feedback received to-date as set out in **Section 8.3** above. Information presented in this Chapter is preliminary, therefore this scope will continue to be reviewed as a result of ongoing engagement and consultation.

8.5.2 This section provides an update to the scope of the assessment and updates the evidence base for scoping out elements following further iterative assessment. Further information can be found in **Chapter 5: Environmental Impact Assessment Methodology**.

8.5.3 The starting point for defining the scope of the terrestrial ecology and nature conservation assessment was to assess the baseline data that was collected through the desk study and field surveys undertaken to-date (see **Section 8.7**) to determine which of the identified ecological features are 'important'. Following CIEEM (2018) guidance (Ref 8-15), the importance of each ecological feature was determined using a geographic scale (see full details in **Table 8-8**). With the exception of species receiving specific legal protection, or those subject to legal control (for example, invasive species), all ecological features determined to be important at below the 'local' level are scoped out of the assessment. This approach is consistent with that described in CIEEM (2018) (Ref 8-15).

8.5.4 Ecological features that are of sufficient importance were then taken through to the next stage of the scoping assessment. Through an understanding of the activities associated with the Proposed Development during construction, operation and decommissioning and the resulting environmental changes, it is possible to identify ecological features that may be subject to potentially significant effects or may be scoped out.

8.5.5 When scoping in or out important ecological features from further assessment,

embedded environmental measures (see **Section 8.8**) associated with good practice have been taken into account.

8.5.6 The scoping also takes into account the Zone of Influence (ZoI) as described in paragraph **8.4.11**, as some important ecological features may be affected by environmental change beyond the PEIR Assessment Boundary.

8.5.7 Wherever there is uncertainty as to the potential level of effect or the occurrence of a particular ecological feature, a precautionary approach has been taken.

8.5.8 The ecological features shown in **Table 8-6** provide the evidence base for scoping in and out elements of the assessment.

Table 8-6 – Ecological Features scoped in or out of the assessment

Ecological Feature	Phase	Scoped In	Scoped Out	Justification
Severn Estuary Ramsar/ SAC/ SSSI	Construction and Decommissioning	✔		Potential pollution/ dust impacting offsite designations.
	Operation	✔		There is potential for beneficial effects to downstream receptors, including the cessation of harmful agricultural practices such as the application of fertilisers, herbicides, pesticides, soil compaction, ploughing and over-grazing which could affect water quality.
River Usk SAC	Construction and Decommissioning	✔		Potential pollution/ dust impacting offsite designations.
	Operation	✔		There is potential for beneficial effects to downstream receptors, including the cessation of harmful agricultural practices such as the application of

			fertilisers, herbicides, pesticides, soil compaction, ploughing and over-grazing which could affect water quality.
Wye Valley and Forest of Dean Bat Sites SAC	Construction, Decommissioning and Operation	✔	The Site lies outside the 'Sensitive Locations' detailed within the Wye Valley and Forest of Dean Bat SAC: Development Management – Horseshoe Bat activity survey and assessment guidance (2021) (Ref 8-21). Given the distance from the Site boundary to the SAC (9.5km), and that the site is outside the core sustenance area (4km) for horseshoe bats from the SAC roosts, it is considered that the Proposed Development would have no direct impact to either the SAC itself or significant indirect effects.
Gwent Levels (covering Magor and Undy SSSI, Redwick and Llandevenny SSSI, Whitson SSSI and Nash and Goldcliff SSSI)	Construction and Decommissioning	✔	Potential pollution/ surface water runoff impacting reens, aquatic invertebrates, qualifying features of the Gwent Levels SSSI, fish, European eel and water quality of downstream receptors. Potential loss of habitat for qualifying features of SSSI, e.g. shrill carder bee.

	Operation	✔		There are potential beneficial or adverse effects to the SSSI notified features as a result of the Proposed Development during operation depending on the management practices undertaken. Beneficial effects will occur to the SSSI notified features due to the removal of one side of double hedges to provide more sunlight to the reens, reprofiling of banks and de-siltation.
Magor Marsh SSSI	Construction and Decommissioning	✔		Potential pollution/ dust impacting offsite designations.
	Operation	✔		Hydrological effects are considered in Chapter 10 Water Environment
Newport Wetlands SSSI/ NNR	Construction and Decommissioning	✔		Potential pollution/ dust impacting offsite designations.
	Operation	✔		Hydrological effects are considered in Chapter 10 Water Environment
Non-statutory designated sites	Construction and Decommissioning	✔		Potential pollution/ dust impacting offsite designations.
	Operation		✔	These sites all lie outside the PEIR Assessment Boundary and no pathway of effect has been identified during operation.
Coastal Floodplain	Construction and Decommissioning	✔		Permanent land take of habitats including

Grazing Marsh			HPI coastal floodplain and grazing marsh for permanent access tracks, panel installation, inverters and grid yard. This includes four potential options for the grid connection. Temporary habitat loss/ damage due to vehicle tracking and temporary access tracks.
	Operation	✔	There is potential for beneficial or adverse effects to the retained habitats as a result of the Proposed Development, depending on the long-term management practices undertaken, including the cessation of harmful agricultural practices such as the application of fertilisers, herbicides, pesticides, soil compaction, ploughing and over-grazing which could further have beneficial effects on a range of floral and faunal species.
Wet reens/ ditches	Construction and Decommissioning	✔	Potential pollution/ surface water runoff impacting reens, aquatic invertebrates, qualifying features of the Gwent Levels SSSI, fish, European eel and water quality of downstream receptors.

	Operation	✔		There are potential beneficial or adverse effects to the SSSI notified features as a result of the Proposed Development during operation depending on the management practices undertaken.
Hedgerows	Construction and Decommissioning	✔		Permanent removal of hedgerow sections to allow access and crossing points, and therefore additional fragmentation impacts on commuting/ foraging bats, dormouse and other species.
	Operation	✔		There is potential for beneficial or adverse effects to the retained habitats as a result of the Proposed Development, depending on the long-term management practices undertaken, including the cessation of harmful agricultural practices such as the application of fertilisers, herbicides, pesticides, soil compaction, ploughing and over-grazing which could further have beneficial effects on a range of floral and faunal species.
Other Habitats (e.g. arable)	Construction, Decommissioning and Operation		✔	These habitats are not considered to hold ecological value at the geographical importance levels scoped into the

				assessment; therefore, no significant adverse effect will occur as a result of its loss.
Roosting bats	Construction and Decommissioning	✔		Lighting causing disturbance/ behavioural changes to nocturnal species.
	Operation		✔	Operation phase is considered unlikely to have adverse effects as no trees with bat roost potential will be removed during operation and no lighting proposed adjacent to trees.
Commuting/ foraging bats	Construction and Decommissioning	✔		Permanent removal of hedgerow sections to allow access and crossing points, and therefore additional fragmentation impacts on commuting/ foraging bats, dormouse and other species. Lighting causing disturbance/ behavioural changes to nocturnal species.
	Operation	✔		Solar Panels may result in collision risk for bats.
Amphibians (great crested newt)	Construction and Decommissioning	✔		Temporary and permanent habitat loss/ damage due to panel installation, vehicle tracking and temporary access tracks. Accidental killing/ injury, disturbance or displacement of faunal

				species during construction.
	Operation	✔		Potential for beneficial or adverse effects depending on future management regime.
Dormice	Construction and Decommissioning	✔		Permanent removal of hedgerow sections to allow access and crossing points, and therefore additional fragmentation impacts on commuting/ foraging bats, dormouse and other species. Lighting causing disturbance/ behavioural changes to nocturnal species. Accidental killing/ injury, disturbance or displacement of faunal species during construction.
	Operation		✔	No hedgerow loss will be undertaken during operation and the LEMP will ensure long-term sensitive management. The operational phase will not introduce additional adverse impacts on dormice such as lighting, domestic pets (cats) or noise disturbance.
Otter	Construction and Decommissioning	✔		Lighting causing disturbance/ behavioural changes to nocturnal species.
	Operation	✔		Potential fragmentation of habitats for mammals

				such as badger, otter and brown hare due to fence installation, and therefore overall loss of foraging grounds.
Water vole	Construction and Decommissioning	✔		Lighting causing disturbance/ behavioural changes to nocturnal species. Accidental killing/ injury, disturbance or displacement of faunal species during construction.
	Operation	✔	*a*	No significant impacts are predicted during the operational phase as once infrastructure is in place, no impacts will occur to banks and watercourses.
Aquatic invertebrates	Construction and Decommissioning	✔		Potential pollution/ surface water runoff impacting reens, aquatic invertebrates, qualifying features of the Gwent Levels SSSI, fish, European eel and water quality of downstream receptors.
	Operation	✔		There are potential beneficial or adverse effects to the SSSI notified features as a result of the Proposed Development during operation depending on the management practices undertaken. Beneficial effects will occur to the SSSI notified features due to the removal of one side of double hedges to provide more

			sunlight to the reens, reprofiling of banks and de-siltation. Potential for aquatic invertebrates to lay eggs on panels, reducing overall reproductive success.
Terrestrial invertebrates	Construction and Decommissioning	✔	Temporary habitat loss/ damage due to vehicle tracking and temporary access tracks.
	Operation	✔	There are potential beneficial or adverse effects to the SSSI notified features as a result of the Proposed Development during operation depending on the management practices undertaken. Beneficial effects will occur to the SSSI notified features due to the removal of one side of double hedges to provide more sunlight to the reens, reprofiling of banks and de-siltation.
Reptiles	Construction and Decommissioning	✔	Temporary habitat loss/ damage due to vehicle tracking and temporary access tracks. Accidental killing/ injury, disturbance or displacement of faunal species during construction.
	Operation	✔	Potential for beneficial or adverse effects depending on future management regime.

European eel & fish	Construction and Decommissioning	✔	Potential pollution/ surface water runoff impacting reens, aquatic invertebrates, qualifying features of the Gwent Levels SSSI, fish, European eel and water quality of downstream receptors.
	Operation	✔	There are potential beneficial or adverse effects to the SSSI notified features as a result of the Proposed Development during operation depending on the management practices undertaken. Potential effects of EMFs impacting water temperature.
Badger	Construction and Decommissioning	✔	Potential for entrapment in excavations. Disturbance of setts during excavations.
	Operation	✔	Potential fragmentation of habitats for mammals such as badger, otter and brown hare due to fence installation, and therefore overall loss of foraging grounds.
Hedgehog	Construction and Decommissioning	✔	Potential for entrapment in excavations.
	Operation	✔	Potential fragmentation of habitats due to fence installation, and therefore overall loss of foraging grounds.

	Construction and Decommissioning	✔		Temporary habitat loss/ damage due to vehicle tracking and temporary access tracks. Displacement during works.
Brown hare	Operation	✔		Potential fragmentation of habitats for mammals such as badger, otter and brown hare due to fence installation, and therefore overall loss of foraging grounds.
Harvest mouse	Construction, Decommissioning and Operation		✔	This receptor is not considered important above the 'Site' geographic level, therefore has been scoped out of further assessment. It is anticipated that the embedded mitigation measures such as reen/ ditch buffers and an ongoing management would ensure this species continues to be present on site.

Extent of the Study Area

8.5.9 The Study Area or Zone of Influence (ZoI) incorporates areas where significant effects could have potential to occur throughout the life of the Proposed Development and has been extended beyond the PEIR Assessment Boundary for certain components defined below to take into consideration populations of more mobile species and the effects that could occur, with reference to the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (2018) (Ref 8-15). The Study Area is as follows:

- Land within the PEIR Assessment Boundary;

- An additional 30m (from the PEIR Assessment Boundary) for badger setts, which may have tunnels extending into the PEIR Assessment Boundary;
- An additional 250m for ponds, in relation to their potential for great crested newts;
- A desk-based search within 10km of the Photovoltaic (PV) Array Works Area for international / European designated sites;
- A desk-based search within 3km of the PV Array Works Area for other statutory designated sites and non-designated sites; and
- A desk-based search within 2km of the Solar PV Array Works Area for records of protected and notable species, extended to 10km for rare bats.

8.5.10 The baseline survey work also encompassed additional land due to changes in the PEIR Assessment Boundary during the course of the initial design stage; this has been referred to where relevant to the assessment.

Method of Baseline Data Collection

8.5.11 To date, a number of habitat and species surveys have been undertaken following best practice guidance, and following consultation advice, as detailed in **Table 8-7**. Note that bird surveys are discussed in **Chapter 9: Ornithology**.

8.5.12 Further surveys planned to be carried out at the Site prior to ES submission include update bat activity surveys, otter/ water vole surveys, dormouse surveys and ground level tree assessments for roosting bats; these will be reported within the ES.

Table 8-7 - Ecological field surveys completed

Survey and relevant technical appendix	Survey Area	Survey Method	Date of Survey Period
Desk-based study Appendix 8A	Various – see Survey Method column.	A desk-based study included a data enquiry from South-East Wales Biodiversity Records Centre (SEWBReC) in January 2024 for designated sites within 3km and records of protected and notable species within 2km of the site boundary, extended to 10km for bat species. A search was made of the UK governments on-	January 2024

		line tool Multi-Agency Geographic Information for the Countryside (MAGIC) for International/ National Site Network sites up to 10km from the PEIR Assessment Boundary, and for ponds within 250m.	
Extended Phase 1 Habitat Survey Appendix 8B	Land within PEIR Assessment Boundary	Walkover in accordance with JNCC Phase 1 Habitat Survey methodology (Ref 8-22) to identify, describe and map all habitats, record a comprehensive botanical list for each habitat and record any habitats or features of ecological interest. Extended to record protected/ notable species, including badger.	**2019** -14th, 23rd and 24th July, 14th and 15th August, 23rd and 25th September. **2023** – 17th, 18th, 25th and 26th July. **2024** – 25th and 26th November (cable route only) **2025** – 22nd, 23rd and 24th July.
Botanical Assessment Appendix 8B	Suitable fields within PEIR Assessment Boundary	Detailed assessment of semi-improved and marshy/ wet grassland fields, plus any grassland field where shrill carder bee was recorded previously. The methodology entailed detailed sampling using 1m^2 quadrats, to collect detail on species and frequency, adapted from the Farm Environment Plan (Ref 8-23), as well as estimated percentage cover of bare ground, herbs, sedges, rushes and undesirable species.	**2025** – 22nd, 23rd and 24th July.
National Vegetation Classification (NVC) survey Appendix 8C	Sample of reens/ ditches within PEIR Assessment Boundary	Reens were sampled across the Site in accordance with NVC survey methodology (Ref 8-24) (Ref 8-25), to gain a representative picture of community variation across the Site.	**2023** – 25th, 26th and 27th July
Tree potential roost feature (PRF) assessment	Suitable trees within PEIR Assessment Boundary	Trees were inspected from ground-level in accordance with BCT guidance (Ref 8-26) in 2019.	**2019** – 20th and 21st May, 12th September

Appendix 8E		All trees that were categorised as low, medium or high bat roost potential were inspected aerially in accordance with BCT guidance (Ref 8-26) in 2021. Update surveys in winter 2025/ 26 will focus on trees impacted by crossing point locations or within 25m, and will follow current BCT guidance (Ref 8-27).	**2021** – 15th and 16th February **2025/26** – further survey proposed
Bat activity surveys Appendix 8E	Land within PEIR Assessment Boundary	Monthly walked transects and automated detector surveys in accordance with BCT guidance (Ref 8-26). Update surveys are partially complete covering July – October 2025 and April – June 2026, comprising seasonal night-time bat walkovers and monthly automated detectors surveys in accordance with current BCT guidance (Ref 8-27). Due to the scale of the Proposed Development this takes a sampling approach to focus on areas where construction will remove important linking habitat corridors.	**2020** – April - October **2023 –** April – October **2025/26** – partially complete
Great crested newt survey Appendix 8D	Ponds within and up to 250m from PEIR Assessment Boundary	Habitat Suitability Index (HSI) following (Oldham *et al*., 2000) (8-28) and eDNA (15 locations in 2019) following the methodology described in the Defra Report WC1067 (Ref 8-29) and the subsequent Technical Advice Note (Ref 8-30). Presence/ absence survey of Location 1 (positive for eDNA) in May 2020. eDNA (covering additional 7 reen sampling locations and 3 further ponds in 2023. eDNA (covering 10 sampling locations) in 2025. Locations for sampling reens were selected to cover a wide geographic range with a minimum of 500m between samples. GCN eDNA can theoretically move around the ditch network as it flows meaning the “classic”	**2019** – 20th and 21st May **2020** – 2nd, 9th and 20th April, 7th, 16th and 24th May. **2023** – 6th June **2025** – 14th, 15th, 22nd, 23rd, 28th, 30th April and 6th May.

		methodology cannot be fully employed. Presence/ absence survey of Location 1, Pond 4 and Location 15 in April/ May 2025 in accordance with methods stated within the Great Crested Newt Mitigation Guidelines (Ref 8-31).	
Dormouse survey Appendix 8F	Land within PEIR Assessment Boundary	Dormouse nest tube survey in accordance with the Dormouse Conservation Handbook (Ref 8-32), with 300 tubes deployed to sample six areas of 50 tubes to give strong geographic coverage. Update surveys are partially complete and focus on sampling high quality dormouse habitat close to previous positive results.	**2020** – March - October **2023 –** April – October **2025/26** – partially complete
Riparian mammal survey Appendix 8H	PEIR Assessment Boundary and up to 100m where access allowed.	Survey of reens, searching for otter signs (footprints, runs, trails, spraint (faeces), anal jelly, urine burns, food remains, flattened grass (sometimes with spraint), slides couches and holts) following National Rivers Authority (2001) (Ref 8-33) and Highways Agency (1999) (Ref 8-34). Signs for water vole were targeted in areas where the habitat was suitable, in accordance with Dean *et al* (2016) (Ref 8-35). Camera traps were used in targeted areas.	**2024 –** 4th – 19th March **2025/26** – further survey proposed
Aquatic invertebrate survey Appendix 8G	Land within PEIR Assessment Boundary	Sampling followed the protocols in Palmer et al. (2013) (Ref 8-36), with each location comprising three sample points laid out along a reen. Samples sites were selected on habitats with greatest invertebrate interest (e.g. ditches with shallow margins and a diverse flora).	**2020** – 20th – 24th May and 29th May – 2nd June. **2023** – 3rd – 5th June and 29th – 31st July. **2025/26** – further survey proposed
Terrestrial invertebrate survey (including	Land within PEIR Assessment Boundary	Methods broadly followed Drake *et. al.*, 2007 (Ref 8-37), using a butterfly net, sweeping with a heavy-duty entomological sweep	**2020** – 16th – 24th July and 12th – 13th August

shrill carder bee) **Appendix 8G**	net or tapping specific invertebrate foodplants over a tray. For the bumblebee surveys, all *Bombus* species recorded in each survey unit/sub-unit were noted, with the number of shrill and brown-banded carder bumblebees being counted, along with the flower species at which they were seen foraging. Sample sites were selected on habitats with greatest invertebrate interest (e.g. stands of relatively semi-improved or unimproved species-rich grassland and short ruderal vegetation).	**2023** – 3rd – 5th June and 29th – 31st July. **2025/26** – July – September.

8.5.13 Reptile surveys were scoped out as it was considered that with embedded avoidance and mitigation, significant impacts on reptiles would be unlikely. The intensive management of the fields precludes the presence of reptiles in the majority of the fields, with suitable habitat limited to vegetation surrounding reens and hedgerows, which will be retained within buffers. Common species grass snake and slow worm may be present in these areas in low numbers, however there is no suitable habitat for adder or rare reptiles. There were 60 records of reptiles within 2km of the Site returned by SEWBReC in the last 10 years. None of these records were within the Site; the nearest of these records were for grass snake and slow worm, approximately 350m north of the Site. Considering proportionality under BS42020, the presence of small numbers of common reptiles can be assumed and a survey would not add additional value to the assessment. Therefore, surveys to ascertain the likely presence/ absence of reptiles were not undertaken.

8.5.14 Surveys for European eel and migratory fish were also scoped out as impacts to reens are proposed to be minimised due to the provision of non-developable buffers which will be enhanced, although for the purpose of the assessment they are assumed present. This approach was agreed with NRW (NRW Senior Advisor – Development Planning, email dated 08.11.24). Furthermore, reen enhancements will increase water quality for eels and fish with timing able to be controlled to minimise any immediate impacts.

Assessment Methodology

General Approach

8.5.15 The assessment methodology has been developed with reference to the CIEEM Guidelines for Ecological Impact Assessment in the United Kingdom (Ref 8-15) and from considerable experience of EcIA relating to similar developments throughout the UK.

8.5.16 These guidelines set out the process for assessment through the following stages:

- Describing the ecological baseline;
- Identifying and evaluating 'Important Ecological Features' (IEFs);
- Identifying and characterising the likely effects on IEFs during construction, operation and decommissioning;
- Determining the significance of effects in the absence of mitigation;
- Describing mitigation, compensation and/or enhancement measures associated with the development and assessing residual significance;
- Assessing cumulative effects with other projects/ plans; and
- Identification of monitoring requirements.

8.5.17 The baseline for this assessment comprises the habitats, species and designated sites within the Site plus those within the Zone of Influence (ZoI) of the Site. The ZoI describes the area over which construction, operational and decommissioning activities associated with the Proposed Development could influence identified ecological features/receptors. The ZoI varies for different ecological features depending on its sensitivity to an environmental change.

8.5.18 The approach also takes into account the Step-Wise Approach (with reference to the DECCA Framework) to assess impacts, in accordance with Edition 12 of Planning Policy Wales (February 2024) (Ref 8-7). Paragraph 6.4.11 states "*planning authorities must follow a step-wise approach to maintain and enhance biodiversity, build resilient ecological networks and deliver net benefits for biodiversity by ensuring that any adverse environmental effects are firstly avoided, then minimised, mitigated and as a last resort compensated for.*"

8.5.19 These steps are as follows:

"*1a) The first priority for planning authorities is to avoid damage to biodiversity in its widest sense (i.e. the variety of species and habitats and their abundance) and ecosystem functioning. Where there may be harmful environmental effects, planning authorities will need to be satisfied that any reasonable alternative sites (including alternative siting and design options) that would result in less harm, no harm or benefit have been considered.*

1b) Proposals in statutory designated sites are, as a matter of principle, unacceptable and therefore must be excluded from site searches undertaken by developers. This principle also extends to those sites containing protected species and habitats which are irreplaceable and must be safeguarded. Such sites form the heart of resilient ecological networks and their role and the ecosystem services they provide must be protected, maintained and enhanced and safeguarded from development. It will be wholly exceptional for development to be justifiable in such instances.

2. When all locational, siting and design options for avoiding damage to biodiversity have been exhausted, applicants, in discussion with planning authorities, must seek to minimise the initial impact on biodiversity and ecosystems by:

- Maintaining the largest possible area of existing habitat supporting biodiversity and functioning ecosystems particularly Section 7 habitats and species where present, by minimising development size and appropriate orientation on site, paying due regard to the potential for continued long term maintenance and management of retained areas to benefit biodiversity;
- Ensuring that retained habitats continue to be well connected to adjacent habitats to provide connectivity for key species and ensuring that the favourable conservation status of local species populations is maintained;
- Retaining existing features, develop a management plan for their future care (e.g., trees, hedgerows, species rich grasslands, heath, wetlands, ponds and freshwater habitats) and use appropriate buffers to protect these from construction and operational impacts; and

- Using proven innovative/creative solutions (where required) to minimise damage and maintain existing biodiversity features and ecosystems in tandem with robust monitoring and rectification strategies.

3a) Where after measures to minimise impact, biodiversity and ecosystems could still be damaged, or lost through residual impacts, the proposed development should mitigate that damage. Mitigation measures must be put in place to limit the negative effects of a development.

3b) Effective mitigation or restoration measures should be incorporated into the design proposal following the consideration of steps one and two above. Mitigation or restoration measures must be designed to address the specific negative effects by repairing damaged habitats and disturbed species. They should seek to restore in excess of like for like, accounting for disturbance and time lags for the recovery of habitat and species, and in every case, mitigation or restoration measures should seek to build ecosystem resilience within the site and where possible the wider area. In some circumstances, where like for like mitigation measures are not possible, particularly in respect of restoration measures, it may be necessary to consider on site compensation measures in the first instance. In designing mitigation measures where uncertainty exists, applicants should follow the precautionary principle and assume a significant effect. Offsite compensation measures (as set out in step four below) should be considered as a last resort.

4. When all the steps above have been exhausted, and where modifications, alternative sites, conditions or obligations are not sufficient to secure biodiversity outcomes further onsite/immediately proximate, as a last resort offsite compensation for unavoidable damage must be provided. This must be of significant magnitude to fully compensate for any loss. In the absence of a planned approach, compensation measures must be guided by placebased evidence and the onus is on applicants to address the following:

- *Offsite compensation should normally take the form of habitat restoration, or habitat creation, or the provision of longterm management agreements to enhance existing habitats and deliver a net benefit for biodiversity. It should*

also be informed by a full ecological assessment to establish a formal baseline before habitat creation or restoration starts and secured far enough in advance before the loss of biodiversity on site.

- *The Green Infrastructure Assessment should be used to identify suitable locations for securing offsite compensation. Where possible, a landscape–scale approach, focusing on promoting wider ecosystem resilience, should help guide locations for compensation. The Green Infrastructure Assessment should provide a spatial guide to opportunities already identified for securing a net benefit for biodiversity. Using the assessment will help determine whether locations for habitat compensation should be placed close to the development site, or whether new habitat or additional management located further away from the site would best support biodiversity and ecosystem resilience at a wider scale.*

- *Where compensation for specific species is being sought, the focus should be on maintaining or enhancing the population of the species within its natural range. This approach might also identify locations for providing species specific compensation further away from the site. Where they exist, Spatial Species Action Plans should be used to help identify suitable locations.*

- *Any proposed compensation should be place based, take account of the Section 6 Duty (Biodiversity and Resilience of Ecosystems Duty), the DECCA framework and appropriate ecological advice from the local authority Ecologist, NRW or a suitably qualified ecologist.*

5. Each stage of the stepwise approach must be accompanied by a long term management plan of agreed and appropriate avoidance, minimisation, mitigation/restoration and compensation measures alongside the agreed enhancement measures. The management plan should set out the immediate and ongoing management of the site, future monitoring arrangements for all secured measures and it should clearly identify the funding mechanisms in place to meet the management plan objectives. The management plan must set out how a net benefit for biodiversity will be achieved within as short a time as possible and be locally

responsive and relevant to local circumstances.

6. Finally, where the adverse effect on biodiversity and ecosystem resilience clearly outweighs other material considerations, the development should be refused."

8.5.20 The DECCA Framework is similarly explained and refers to the resilience of ecosystems in the following regards:

- Diversity;
- Extent;
- Condition;
- Connectivity; and
- Adaptability to change.

Determining Value

8.5.21 The importance and sensitivity of ecological features have been determined based on CIEEM Guidelines. Whilst the legal protection afforded to habitats and species does not necessarily reflect actual biodiversity value, the assessment methodology will fully acknowledge statutory requirements, policy objectives, rarity, rate of decline, and local or intrinsic nature conservation value.

8.5.22 Important Ecological Features have been defined on a geographical scale (international, national (Wales), regional, county or local) according to:

- The statutory and non-statutory designated sites present, and their associated qualifying features/species;
- Habitats and species of conservation concern, including those of Principal Importance IN Section 7 of the Environment (Wales) Act 2016 (Ref 8-5) and the Local Biodiversity Action Plan (Local BAP) which may be present on the Site or in the surrounding area; and
- The local distribution of protected species in the area, for which the Site may support suitable habitat.

8.5.23 Individual ecological features were assigned levels of importance for nature conservation in a geographical context as set out in **Table 8-8**.

Table 8-8 - Criteria for Valuing Important Ecological Features

Geographic Value	Description
International or European	Statutory Sites designated or classified under international conventions or European legislation for example Biosphere Reserves, Wetland of International Importance (Ramsar Sites), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). Regular or significant populations of internationally important species.
National	Statutory Sites designated under national legislation for example Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Marine Nature Reserves (MNR). Habitats and Species of Principal Importance listed under Section 7 of the Environment (Wales) Act 2016 (Ref 8-5). Species which are threatened or rare in the UK.
Regional	Local Nature Reserves (LNR), ancient woodland, species or species assemblages considered rare in south Wales.
County	Sites meeting the criteria for county designations e.g. Non-statutory Local Wildlife Sites (LWS) or Sites of Interest to Nature Conservation (SINC). Notable species. Species or species assemblages considered rare in the county.
Local	Newport or Monmouthshire Local BAP Priority Habitats and Species. Species and habitats that are not threatened but are valued at a local level.

8.5.24 Features not meeting the criteria of being 'important' within CIEEM's geographic frame of reference will be scoped out of the assessment as it will be considered that impacts upon them are unlikely to be significant (in terms of legislation, policy or nature conservation value).

Identifying Effects and Determining Magnitude

8.5.25 The assessment will be undertaken in accordance with the CIEEM guidelines (2018). This differs from the approach used for other environmental disciplines, where the significance of an effect is based on a combination of the magnitude of the change and the sensitivity of the receptor.

8.5.26 The potential effects of the Proposed Development on IEF's will be characterised, taking into account relevant aspects of ecosystem structure and function, according to the following terms:

- beneficial or adverse;
- extent;

- magnitude;
- duration;
- frequency and timing; and
- reversibility.

8.5.27 As per the guidelines, only those characteristics relevant to understanding the ecological effect of the impacts and determining its significance are described.

8.6 Significance Criteria

Determining Significance

8.6.1 For the purpose of the ecological impact assessment, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives, irrespective of the value of the ecological receptor. Once a significant effect has been identified (i.e. it is considered likely to affect the integrity / favourable conservation status of an ecological feature), the importance of the receptor will be used to help determine the geographical scale at which the effect is significant.

8.6.2 As stated in the CIEEM guidelines (2018), *"the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, an effect on a species which is on a national list of species of principal importance for biodiversity may not have a significant effect on its national population"*. Where a significant effect on integrity/ favourable conservation status is not predicted for a given geographical level, consideration will be given to whether an effect may be significant at lower geographical levels.

Description of Likely Significant Effects

8.6.3 Significant effects upon the ecological features present within the ZoI may arise either directly or indirectly in the absence of mitigation.

8.6.4 Direct impacts include land take, disturbance, fragmentation and killing/ injury of species. Indirect impacts include habitat degradation which can affect conservation status (e.g. as a result of pollution or lighting).

8.6.5 The PEIR includes a separate Draft Shadow Habitats Regulations Appraisal (HRA) (see **Appendix 8I**) to assist the competent authority in conducting the Appropriate Assessment that will be required prior to determination of the application.

8.6.6 Where no likely significant effects are predicted on an IEF, these will be scoped out of further assessment in the ES chapter.

8.6.7 Note that effects on birds including those associated with the Severn Estuary SPA/ Ramsar and other designated sites are addressed in the **Chapter 9: Ornithology**.

8.6.8 **Table 8-9** below demonstrates how the CIEEM criteria of significance has been adapted to match the other chapters.

Table 8-9 - Relating CIEEM assessment terms to those used in other EIA chapters

Effect classification terminology used in other EIA chapters	Equivalent CIEEM assessment
Major (significant)	Significant at International/ European scale
Major (significant)	Significant at National scale
Moderate (probably significant)	Significant at Regional scale
Moderate (probably significant)	Significant at County scale
Minor (not significant)	Significant at Local scale
Negligible (not significant)	Significant at Site scale or below

8.7 Baseline Conditions

Designated Sites

8.7.1 A summary of statutory designated sites within the Study Area and scoped into the assessment due to the potential to be impacted is provided in **Table 8-10** and illustrated in Figures 8.1.1 and 8.1.2 in **Appendix 8A**.

Table 8-10 - Sites statutorily designated for the biodiversity value within 10km (international) and 3km (national) of the PEIR Assessment Boundary

Statutory Site Name and designation	Description	Distance (km) and direction from the closest point of the PEIR Assessment Boundary	Importance
Severn Estuary Ramsar	The Ramsar site covers over 24,000 hectares (ha) and meets the following Ramsar criteria: Ramsar criterion 1 Due to immense tidal range (second-largest in world), this affects both the physical environment and biological communities. Habitats Directive Annex I features present include: • H1110 Sandbanks which are slightly covered by sea water all the time • H1130 Estuaries • H1140 Mudflats and sandflats not covered by seawater at low tide • H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Ramsar criterion 3 • Due to unusual estuarine communities, reduced diversity and high productivity. Ramsar criterion 4 • This site is important for the run of migratory fish between sea and river via estuary. • It is also of particular importance for migratory birds during spring and autumn. Ramsar criterion 8	0.02km south	International

- The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Salmon, sea trout, sea lamprey, river lamprey, allis shad, twaite shad and eel use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species particularly allis shad and twaite shad which feed on mysid shrimps in the salt wedge.

Ramsar criterion 5

- Assemblages of international importance: Species with peak counts in winter: 70919 waterfowl (5 year peak mean 1998/99-2002/2003)

Ramsar criterion 6

- Species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): **Species with peak counts in winter**:
- Tundra swan
- Greater white-fronted goose
- Common shelduck
- Gadwall
- Dunlin
- Common redshank

- Species/populations identified subsequent to designation for possible future consideration under criterion 6. **Species regularly supported during the breeding season**:

	• Lesser black-backed gull • Species with peak counts in spring/autumn: • Ringed plover **Species with peak counts in winter**: • Eurasian teal • Northern pintail		
Severn Estuary Special Protection Area (SPA)	Refer to **Chapter 9: Ornithology**.	0.02km south	European
Severn Estuary Special Area of Conservation (SAC)	Designated primarily for Annex I habitats: • Estuaries • Mudflats and sandflats not covered by seawater at low tide • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Annex I habitats present as a qualifying feature: • Sandbanks which are slightly covered by sea water all the time. • Reefs Designated primarily for Annex II species: • Sea lamprey • River lamprey • Twaite shad	0.02km south	European
River Usk SAC	Designated primarily for Annex II species: • Sea lamprey • Brook lamprey • River lamprey • Twaite shad • Atlantic salmon • Bullhead • Otter Annex I habitats present as a qualifying feature: • Watercourses of plain to montane levels with the	3.7km west	European

	Ranunculion fluitantis and Callitricho-Batrachion vegetation. Annex II species present as a qualifying feature: • Allis shad.		
Gwent Levels – Magor and Undy SSSI	One of a series of six SSSIs, totalling 5700 hectares (about 14 000 acres) lying alongside the Severn Estuary. The land is below high mean water level and the sea is kept out by extensive sea defences. Traditionally, fields are drained by a system of ridge and furrow or 'grips' (shallow trenches) into the extensive system of interconnected ditches that surrounded each field. Gwent Levels: Magor and Undy SSSI is the most easterly and is different from the other Gwent Levels SSSIs in that much lies on peat as opposed to clay. As a result, the remnant fen meadows within the SSSI support a far wider range of plants than other areas across the Gwent Levels. It has three special features: • Reen and ditch habitat • Insects and other invertebrates • Shrill carder bee	Within the PEIR Assessment Boundary	National
Gwent Levels – Redwick and Llandevenny SSSI	Part of the Gwent levels as described above, with three special features: • Reen and ditch habitat • Insects and other invertebrates • Shrill carder bee	Within the PEIR Assessment Boundary	National
Gwent Levels – Whitson SSSI	Part of the Gwent levels as described above, with three special features: • Reen and ditch habitat • Insects and other invertebrates • Shrill carder bee	Within the PEIR Assessment Boundary	National

Gwent Levels – Nash and Goldcliff SSSI	Part of the Gwent levels as described above, with three special features: • Reen and ditch habitat • Insects and other invertebrates • Shrill carder bee	Partially within the PEIR Assessment Boundary at NW corner	National
Severn Estuary (Wales) SSSI	The Severn Estuary lies at the mouth of four major rivers (the Severn, Wye, Usk and Avon) and many lesser rivers. The immense tidal range (the second highest in the world) and classic funnel shape make the Severn Estuary unique in Britain and very rare worldwide. The intertidal zone of mudflats, sand banks, rocky platforms and saltmarsh is one of the largest and most important in Britain. The estuarine fauna includes: internationally important populations of waterfowl; invertebrate populations of considerable interest; and large populations of migratory fish.	0.02km south	National
Magor Marsh SSSI	Magor Marsh is the last relatively natural area of fenland on the Gwent Levels. It is understood that water voles were released here by Gwent Wildlife Trust between 2012 and 2013 (Gwent Wildlife Trust (2013).	0.8km north	National
Newport Wetlands SSSI	Newport Wetlands SSSI is part of the Newport Wetlands NNR, which was constructed to meet the commitment by the UK Government to create “a substantial area of wetland habitat on the shores of the Severn Estuary” as part of the compensation for the loss of the Taf/Ely Estuary SSSI following the construction of the Cardiff Bay Barrage. Newport Wetlands SSSI has a number of special features including: • Reens and ditches	1.1km west	National

	• Reedbeds • Higher plants • Over-wintering birds • Insects and other invertebrates		
Newport Wetland National Nature Reserve (NNR)	Newport Wetlands is best known for its range of wetland birds. This reserve at the mouth of the river Usk was opened in 2000 to compensate for loss of extensive mudflats with the completion of the Cardiff Bay barrage. It stretches from Goldcliff to Uskmouth and was once an ash covered wasteland for the neighbouring coal-fired Uskmouth power station. The reserve covers 4.38 sq km (438 hectares) and provides a variety of habitats including reedbeds, saltmarsh, saline lagoons and lowland wet grassland. In 2008 it was designated as a National Nature Reserve.	1.1km west	National

8.7.2 A summary of non-statutory designated sites within the Study Area and scoped into the assessment due to the potential to be impacted is provided in **Table 8-11**. A full list is provided in **Appendix 8A**.

Table 8-11 - Sites non-statutorily designated for the biodiversity value within 2km of the PEIR Assessment Boundary

Non-statutory site name and designation	Description	Distance (km / m) and direction from the closes point of the PEIR Assessment Boundary	Importance
Elver Pill Reen Grassland & Pond Site of Importance in Nature	Lagoon with mosaic of swamp and marshy and dry semi-improved neutral grassland; supports Cetti's warblers.	Directly adjacent at N Row along north of PEIR Assessment Boundary	County

Conservation (SINC)			
Spencer Works 3 SINC	Marshy grassland with wet drains.	0.3km north	County
Bridewell Common Field SINC	Designated for its species rich grassland, floodplain pastures, mature willow and hedgerows interest.	0.8km north	County
Gwent Wetland Reserve SINC	Mosaic of wet grassland reed beds, open water, hedgerows and saline lagoon, which supports internationally important numbers of wildfowl as well as UK BAP Priority species such as water vole, great crested newt and brown hare.	0.9km west	County
Blackwall Lane Field SINC	Designated for its Priority Habitat of neutral and lowland species interest.	1km north	County
Greenmoor Pool SINC	Formerly standing water which now supports reed swamp (UKBAP Priority Habitat), which itself supports bird populations including Cetti's warbler.	1.1km north	County
Caldicot Moor Meadow SINC	Small flat field on Caldicot Moor containing SI neutral sward with good herb diversity.	1.1km east	County
Land at Barecroft Common SINC	Designated for its lowland species-rich grassland and semi-improved grassland interest.	1.5km north	County
Breezy Bank to Rockfield Farm SINC	Designated for its narrow strip of broadleaved woodland and scrub neighbouring unimproved grassland with scrub, tall herb communities and hedgerows interest.	1.6km north	County
Bluehouse Farm SINC	Designated for its botanically interesting damp and dry grassland interest.	1.6km north	County
Barecroft Fields SINC	Designated for its Priority Habitat lowland species-rich grassland with vascular plants including Thalictrum flavum and Cirsium dissectum interest.	1.6km north	County
Bowkett Field, Barecroft SINC	Designated for its Priority Habitat lowland species-rich marshy grassland with bird interest.	1.7km north	County

Grange Road SINC	Designated for its neutral grassland, watercourse, scattered scrub and hedgerow with ancient woodland indicator species interest	1.9km north	County
Former Steel Works Site off Queensway Meadow SINC	Designated for dragonflies, as well as mosaic habitat (H20) for freshwater, grassland and woodland	1.9km north-west	County
Solutia Site SINC	A series of improved and semi-improved grasslands with traditional ditches and ponds; site supports a range of species including nesting birds such as Cetti's warbler, and invertebrates including hairy dragonfly (Brachyton prantense).	1.9km west	County
Upper Cottage Pond SINC	Designated for its neutral grassland, watercourse, scattered scrub and hedgerow with ancient woodland indicator species interest	2km north	County

Habitats and Flora

8.7.3 The Site is located across approximately 547.69 hectares (ha) of predominantly agricultural farmland on the Gwent Levels. Further details and figures illustrating the distribution of habitats are provided in **Appendix 8B**.

Grassland

8.7.4 The predominant land use is improved grassland used for grazing livestock with fields dominated by Italian rye-grass, perennial rye-grass and/or crested dog's-tail with occasional to frequent common forbs and other grasses. Semi-improved grassland (134.28 hectares (ha)) and small numbers of marshy grassland (14.38ha) fields are also present supporting a higher plant diversity including rushes, sweet vernal grass, agrimony, bird's-foot trefoil, common knapweed and meadow vetchling. Due to the geographical location of these low-lying fields adjacent to the estuary with adjacent ditches, the grasslands all qualify as Coastal and Floodplain Grazing Marsh Habitat of Principal Importance (HPI) in the Environment (Wales) Act 2016 (Ref 8-5), Section 7 Biodiversity Lists.

8.7.5 Coastal and Floodplain Grazing Marsh (CFGM) is described broadly by JNCC as follows:

"Grazing marsh is defined as periodically inundated pasture, or meadow with ditches which maintain the water levels, containing standing brackish or fresh water. The ditches are especially rich in plants and invertebrates. Almost all areas are grazed, and some are cut for hay or silage. Sites may contain seasonal water-filled hollows and permanent ponds with emergent swamp communities, but not extensive areas of tall fen species like reeds; although they may abut with fen and reed swamp communities" (JNCC, 2008, (Ref 8-38*).*

8.7.6 Whilst the vast majority of fields are not diverse in terms of plant species-richness, or structural variation, their location and associated features means that they qualify as CFGM.

Arable

8.7.7 Several fields comprise cropland (maize, barley and grass leys) (57.09ha), which is principally in intensive agricultural management with a low plant diversity. Fields are generally very large and lack field margins other than stands of rank grassland and tall ruderal vegetation at hedgerow margins. The arable fields are not considered to be ecologically valuable and are not HPIs.

Standing water (reens and ditches)

8.7.8 The fields are largely divided by an extensive network of reens and ditches. The reens and ditches are one of the features of the SSSI designation; in particular the aquatic and open water emergent plants and aquatic invertebrates feature in the SSSI citation. The reens are split into main reens, which broadly run from north to south through the Gwent Levels, smaller reens and field ditches. Main reens, designated as main rivers, convey water to the Severn Estuary, where discharge occurs via tidal flaps.

8.7.9 NRW surveys in 2010 – 2013 recorded a good diversity of floating vegetation across the SSSIs, albeit duckweed was dominating a number of areas in the reens and field ditches (Murton et al., 2020). Duckweeds were common throughout the SSSIs, and

indicate high levels of nutrients and potential eutrophication and 63% of the field ditches were also assessed as heavily shaded, limiting their value. Updated results from 2023 recorded a small number of reens improving in quality, with a larger number decreasing in ecological quality, including a number recorded to have dropped to the point of failing the SSSI criteria for the designations (Ref 8-39).

8.7.10 Targeted surveys for the Proposed Development showed that the reens and ditches vary in habitat quality from late successional banks with limited evidence of aquatic influences in the bankside communities which were becoming scrub encroached, to bankside habitats dominated by tall emergent species (primarily common reed) (refer to **Appendix 8C**).

8.7.11 Much of the network is shaded by hedges and/or have become dried out. A statement produced by NRW as part of the South East Area Statement indicates that over recent years, field ditch management appears to have become less of a priority for landowners leading to many of them becoming infilled, overgrown or silted up. However, most of the larger reens and some field ditches are still at least partially unshaded, permanently inundated and with a more diverse aquatic flora. The ditches and reens all form part of the coastal floodplain and grazing marsh HPI.

Standing water (ponds)

8.7.12 One pond is present within the PEIR Assessment Boundary, with additional ponds within the wider Study Area. Ponds have the potential to meet the criteria of the Pond Habitat of Principal Importance in the Environment (Wales) Act 2016, Section 7 Biodiversity List (Ref 8-5), however the onsite pond was a slurry pond and is therefore scoped out of further assessment.

Swamp

8.7.13 Small areas of wetland are present within the north-west of the PEIR Assessment Boundary, dominated by reeds with deep water. Reedbeds are defined as wetlands dominated by stands of the common reed, wherein the water table is at or above ground level and tend to incorporate areas of open water and ditches, and are HPI in the Environment (Wales) Act 2016, Section 7 Biodiversity Lists (Ref 8-5).

Hedgerows

8.7.14 Species-poor native hedgerows are present on numerous field boundaries, largely associated with an adjacent ditch or reen. In places these are in double rows either side of a ditch or reen. Occasionally mature trees are present within hedgerows including ash, oak and crack willow. Hedgerows are HPIs in the Environment (Wales) Act 2016, Section 7 Biodiversity Lists (Ref 8-5). All hedgerows are considered 'Important' under the Hedgerow Regulations 1997 due to the presence of Schedule 5 species dormouse.

Other habitats

8.7.15 Small parcels of other habitat types are present, including dense scrub, tall ruderal vegetation, bare earth, hard standing and buildings.

Fauna

Amphibians

8.7.16 Great crested newts (GCN) are European Protected Species (EPS), Wildlife and Countryside Act 1981 (as amended) Schedule 5 (WCA5) species and Section 7 (S7) of the Environment (Wales) Act species. Common toad is a WCA5 and a S7 species. Common frog, smooth newt and palmate newt are protected from sale or trade only under the WCA5.

8.7.17 SEWBReC returned 24 records of great crested newt within 2km of the Site between 1993 and 2023.

8.7.18 eDNA sampling of five ponds and 28 slow-moving ditches within the Study Area found GCN DNA present within three samples (two onsite ditches and one offsite pond) located towards the western end of the Site (refer to **Figure 8.4.1**, **Appendix 8D**). Traditional surveys of the three waterbodies found no evidence of GCN within the ditches, and it was considered that the eDNA survey results were false positives or due to the connectivity of ditches to the wider landscape bringing in DNA from other sources. This was further reinforced by update eDNA surveys returning negative results.

8.7.19 Traditional surveys of the offsite pond in 2025 found that it supported a small population of GCN (peak count of four adults). The fields within proximity to this pond are considered to be suboptimal terrestrial habitat for this species, however the network of hedgerows and ditches provide potential commuting, shelter and foraging habitat.

8.7.20 Full results are presented in **Appendix 8D**.

Badgers

8.7.21 Badgers are protected under the Badgers Act 1992 in Wales and England. (Ref 8-5

8.7.22 Fifteen records of badger were returned from SEWBReC. Evidence of badger was recorded within the Study Area including a single active sett (offsite but close to the PEIR Assessment Boundary), an inactive sett, prints and several latrines. The majority of evidence is clustered in two locations: the far east of the PEIR Assessment Boundary and south of Redwick within the PEIR Assessment Boundary (refer to Figure 8.2.4, **Appendix 8B**).

8.7.23 The intensively managed, low-lying fields, which make up the majority of the Application Site are of low suitability for sett-building due to the high water table, however, do provide foraging opportunities.

Bats

8.7.24 All bat species in the UK are EPS. Greater horseshoe bats have additional protection under Annex II of the Habitats Directive. Noctule, common pipistrelle, soprano pipistrelle*,* brown long-eared, greater horseshoe and lesser horseshoe are listed on S7 as SPIs and in the Local BAP.

8.7.25 The data search with SEWBReC provided over 1904 bat records within the 10km search area, with 446 of these from the past 10 years. Records show a broad assemblage of 15 species of bats in the area. The data was filtered to include those records listed as ‘roost records’ within a 4km radius of the Site as this distance is equal to or exceeds the core sustenance zone for most species except barbastelle (Ref 8-41). There were 28 roost records within 4km and none within the Site (refer

to Figure 8.5.6, **Appendix 8E**).

8.7.26 During activity surveys, at least nine species were recorded commuting and/or foraging within the Site, with transects indicating that bats favour the boundary hedgerows and reens, with little activity over the open fields (refer to Figures 8.5.1 – 8.5.4, **Appendix 8E**). The majority of activity was from common pipistrelle and this species was widespread and abundant across the Site, with calls recorded during typical emergence times indicating that there are multiple roosts in close proximity to the Site. Annex II species lesser horseshoe, barbastelle and greater horseshoe were recorded in very low numbers and after typical emergence times in both years, indicating that these species are travelling through the site on an occasional basis. There was no distinct pattern of use across within the PEIR Assessment Boundary, however the sea wall along the southern boundary, Mead Lane and Sea St Lane which both support linear routes sheltered by hedgerows/ trees and the boundary of F173 occasionally supported higher numbers.

8.7.27 No evidence of roosting was identified during aerial tree inspections, however suitable roosting features were identified (refer to Figure 8.5.5, **Appendix 8E**) and due to the transitional nature of tree roosting activity, these trees may be used at other times of year and in the future.

8.7.28 Full results are presented in **Appendix 8E**.

Hazel Dormice

8.7.29 Hazel dormouse is an EPS, WCA5, S7 and Local BAP species.

8.7.30 SEWBReC provided 13 records of hazel dormouse within 2km of the Site, including one record within the PEIR Assessment Boundary, south-east of Summerleaze. Several records were returned from a strip of woodland to the north of the Llanwern steel works.

8.7.31 Evidence of dormice was found at three locations during nest tube surveys in both the 2020 and 2023 surveys (refer to Figure 8.6.2, **Appendix 8F**). Locations were widely distributed (one at the far eastern boundary and two to the west of Redwick c. 4.6km away). Whilst these are likely isolated populations, due to the network of

hedgerows throughout the Site and historical record in Summerleaze (between the populations recorded in recent surveys) it is considered possible that all hedgerows on Site might be utilised by dormice.

8.7.32 Full results are presented in **Appendix 8F**.

European Eel

8.7.33 European eel (SPI, Eels (England and Wales) Regulations 2009) is part of a notable sub feature of the 'estuaries' feature for the Severn Estuary SAC and a feature of the Severn Estuary Ramsar. Twenty-three records of European eel occur within the desk study data. Historic monitoring data suggests presence on Elver Pill, Windmill, Cold Harbour and Yoke reens (NRW fisheries team, pers.comm., 29/07/24) which pass through or are connected to the site. As part of the DAS exercise, NRW agreed that eel presence across the Site's waterways could be assumed.

Invertebrates

8.7.34 SEWBReC provided over 2000 records of invertebrates within the search area including 71 species listed under the Environment (Wales) Act 2016, Section 7 Biodiversity Lists. 211 records pertain to shrill carder bee, a species that features on the SSSI designation.

8.7.35 During the invertebrates surveys, 384 species were recorded, of which 18 are notable species (IUCN International or UK threatened or near threatened; Section 7 Species of Principal Importance in Wales; or Red Data Book (RDB), Nationally Rare (NR) or Nationally Scarce (Na, Nb, N, NS, pNS)). The overall assessment indicated that the aquatic and grassland pollinator community of invertebrates is of high ecological importance, however both are currently in sub-optimal condition, with grassland habitats and their associated population of the shrill carder bumblebee being very small and severely threatened (only nine worker bees recorded). Within the Scoping Opinion (**Appendix 1D**), NRW provided advice (Annex 1) that in a 2020 study, six Gwent Levels SSSIs, including Redwick & Llandevenny and Magor & Undy (which are within the PEIR Assessment Boundary) were unfavourable for shrill carder bee.

8.7.36 101 aquatic invertebrates were recorded, including notable species *Peltodytes caesus, Hydaticus transversalis,* great silver water beetle, ornate brigadier soldierfly, *Tachys bistriatus, Badister dilatatus* and *Gymnetron villosulum*. The key aquatic assemblages were associated with mid to late successional reens that are in a cycle of management but have not been cleared of vegetation and detritus recently and where sufficient time has elapsed for submerged macrophytes and emergent vegetation to have become abundant. The better examples of this habitat feature are unshaded by trees and shrubs and are often open to cattle grazing. The latter preventing excessive dominance by tall fen species such as common reed and creating shallow, moderately poached water margins that are favoured by many of the more important aquatic invertebrates occurring on the Gwent Levels. Due to the rotational management of larger ditches and reens on the Gwent levels, the aquatic invertebrate assemblage is considered relatively dynamic and will change from year to year between waterbodies. Many of the smaller ditches are heavily shaded by hedgerows and are mostly in sub-optimal condition. Refer to **Appendix 8B**, Figure 8.2.3 for locations of double hedgerows causing shading over ditches holding water.

8.7.37 Open ditch margins, ruderal vegetation, hedgerows and dead wood habitat features were the key locations for invertebrate assemblages that include some notable species.

8.7.38 Full results are presented in **Appendix 8G**.

Riparian mammals

8.7.39 Otter are EPS, WCA5, S7 and Local BAP species.

8.7.40 Water vole are listed on WCA5, S7 and are a Local BAP species.

8.7.41 The data search returned by SeWBRC returned 1610 records of water vole and 95 records of otter within 2km of the application boundary. Water vole records were mostly in association with Magor Marsh SSSI and surrounding reens, offsite. There were 12 records of water vole field signs within the PEIR Assessment Boundary and are mostly associated with boundary reens and ditches. The largest concentration is three records around Field 64 in the north of the Site. There were 10 records of otter

within the PEIR Assessment Boundary, primarily around Cock Street Reen and Hares Reen. The area with the largest number of records is at the intersection of Cock Street Reen and Yoke Reen. Refer to **Figure 8.8.5** within **Appendix 8H.**

8.7.42 During the surveys, evidence of otter (EPS, SPI, Annex II) was found on several reens/ ditches, with activity focused on five key watercourses – Yoke Reen, Cock Street reens, Mead Lane, Monk's Ditch and the sea wall south of Mead Lane (refer to Figure 8.8.2 and 8.8.3, **Appendix 8H**). Signs indicated otter were moving from the north to the south and the sea wall area. Camera trapping indicated that otter/s are using the main reens to disperse, commute and forage. Two 'possible' holts and a 'possible' resting place were identified and will be subject to further monitoring prior to the ES being prepared.

8.7.43 Evidence of water vole (SPI, WCA Schedule 5) was found on a single reen at the northern edge of the Site. Holes and chewed vegetation were recorded but no latrines found (refer to Figure 8.8.4, **Appendix 8H**. A single incidental sighting was made during a bird survey in 2020, however this is now offsite (c. 300m north). Update surveys are scheduled for 2026.

8.7.44 Full results are presented in **Appendix 8H**.

Reptiles

8.7.45 Slow worm, grass snake, adder and common lizard are all listed in WCA5 and are S7 species.

8.7.46 There were 60 records of reptiles within 2km of the Site returned by SEWBReC in the last 10 years, the nearest of these records were for grass snake and slow worm, approximately 350m north of the PEIR Assessment Boundary.

8.7.47 Suitable habitat for basking, foraging, commuting and sheltering reptiles is present throughout the Site in the form of reen and ditches (for grass snake) and margins and dense hedgerow bases. Intensively grazed improved grassland and arable fields are considered sub-optimal for reptiles and therefore any population is considered to be small, relative to the extent of habitat available.

8.7.48 Two incidental records of individual grass snake were recorded across the Site by ecologists within ditch margins during other surveys (refer to Figure 8.2.4, **Appendix 8B**). This suggests a population of grass snake is present on Site.

Other notable species

8.7.49 Other notable species potentially present on site and capable of being impacted include hedgehog (S7), harvest mouse (S7) and brown hare (S7).

8.7.50 Thirty-three records of brown hare were returned as part of the data search and they were relatively ubiquitous across the Site, present within fields and field edges.

8.7.51 Hedgehogs have not been seen during site visits but can be assumed to be present at least at low density within the hedgerow and field margin habitats, with 42 records present in the desk study data.

8.7.52 Seven harvest mouse records were returned as part of the data search and a single incidental record made to the east of Windmill Reen during the survey work. Harvest mice are associated with hedgerows, long uncultivated grass, ditch banks and field boundaries, rather than open fields and their presence is therefore likely confined to field edges.

Important Ecological Features

8.7.53 **Table 8-12** details the following sensitive receptors that have been assessed. Only receptors assessed as being important at the 'Local' scale or above have been taken forward for further assessment.

Table 8-12 - Summary of important ecological features

Important Ecological Feature	Biodiversity Importance
Severn Estuary Ramsar/ SAC/ SSSI	International/ European/ National
River Usk SAC	European
Gwent Levels (covering Magor and Undy SSSI, Redwick and Llandevenny SSSI, Whitson SSSI and Nash and Goldcliff SSSI)	National
Magor Marsh SSSI	National
Newport Wetlands SSSI/ NNR	National
Non-statutory designates sites	County

Coastal Floodplain Grazing Marsh	National
Wet reens/ ditches	National
Hedgerows	Local
Roosting bats	Local
Commuting/ foraging bats	County
Amphibians	County
Dormice	County
Otter	National
Water vole	County
Aquatic invertebrates	National
Terrestrial invertebrates	National
Reptiles	Local
European eel	County
Badger	Local
Hedgehog	Local
Brown hare	Local
Harvest mouse	Site

8.8 Embedded Design Mitigation

8.8.1 The Commitments Register (**Appendix 19A**) lists the 'embedded environmental measures' which have been developed to avoid and mitigate environmental effects. The intention is to implement all measures as part of the design of the Proposed Development, the preliminary assessment of likely significant effects is based on this assumption.

8.8.2 A summary of those relevant to ecology are listed below:

- Following construction, construction compounds will be returned to previous conditions as far as reasonably possible.
- An outline landscape strategy (the Outline Landscape and Environmental Management Plan or 'oLEMP') will be prepared (refer to **Appendix 8J**).
- The oLEMP will be prepared to ensure benefits to the SSSI features along with monitoring and contingency measures to ensure their maintenance.
- The layout will reflect, where feasible, a preference for the retention and protection of higher value habitats including scrub, mature trees, higher quality grassland and watercourses. Losses of important vegetation will be

compensated for through the planting/ creation of new habitats;

- A Construction Environmental Management Plan (CEMP) will be required with sensitive timing of works, detailed method statements and measures to protect reens from pollution and siltation. An Outline CEMP (oCEMP) has been produced to support this PEIR (**Appendix 2A**).

- Construction methods to avoid significant adverse impacts to retained habitats.

- Existing farm access tracks will be used wherever possible during construction, maintenance and decommissioning; improvements to these tracks including possible widening will be required. These will aim to utilise existing hedgerow gaps wherever possible. Any hedgerow lost during the creation of an access will be replaced within the Proposed Development.

- New reen crossings will be designed to minimise impacts to habitats and riparian species, sited away from sensitive locations (such as water vole burrows) and will avoid fragmentation effects.

- The reens will be buffered to protect them from deterioration, avoid impacts to faunal species and to provide opportunities for habitat enhancement. Buffers to reens of semi-natural habitat will reduce run-off of nutrient enriched water entering the reens, and allow sensitive management for terrestrial invertebrates.

- The reen buffers will be designed to provide high value, semi-natural habitat;

- There will be no obstruction of reens;

- Gaps below fencing to prevent fragmentation for mobile species such as badger and otter;

- Mature trees, particularly those with potential for roosting bats will be retained;

- Where appropriate cabling will be directionally drilled below ground to avoid disturbance to above-ground habitat and watercourses;
- A detailed drainage strategy will be required to show no impacts on the reens or downstream ecological receptors;
- Mitigation licences for impacts to dormouse/ great crested newt habitat with appropriate compensatory habitat where required;
- Creation of new habitats to support and enhance existing faunal populations.
- A decommissioning plan would be developed prior to the end of the project detailing sensitive methods of decommissioning;
- The removal of the southern hedgerow where double hedgerows exist on east-west running hedgerows will allow light to reach the reen, which would be expected to result in increased plant and fauna diversity within the reen.
- Habitat creation for loss of breeding and foraging habitat, including infill hedgerow planting in gaps of retained hedgerows.
- Panel installation to reduce unnecessary land take and allow grassland to be maintained below to provide foraging habitat.

8.9 Assessment of Likely Impacts and Effects

Construction and Decommissioning Phase

Severn Estuary Ramsar/ SAC/ SSSI

8.9.1 Water pollution is identified as a pressure and threat in the Severn Estuary Site Improvement Plan (Ref 8-42) to the following notified features of the SAC: subtidal sandbanks, estuaries, intertidal mudflats reefs, Atlantic salt meadows, sea lamprey, river lamprey and twaite shad. Therefore, potential indirect impacts could occur as a result of pollution/ siltation during both construction and decommissioning (via reens/ ditches to the designation downstream) which could affect both qualifying habitats

and migratory fish by smothering vegetation, as well as have effects on water quality within the estuary.

8.9.2 However, embedded measures, as set out in **Section 8.8**, includes 7m and 12.5m buffers around ditches and main reens respectively, therefore there is a very low risk of any siltation or accidental spillage during panel installation causing pollution in reens and ditches that could eventually end up in the SAC via the reen network, as long as these buffers remain vegetated to slow/ capture run-off. Potential effects regarding run-off and hydrological issues are addressed in **Chapter 10 Water Environment**.

8.9.3 Cable crossing points and access points, which include the construction of small bridges/ cable trays (refer to **Appendix 2D**) could result in localised areas of siltation within the watercourse network. If silt managed to get from the reen and ditch system into the estuary via the reen network this is highly unlikely to result in a significant effect on the Natura sites, as the river and estuarine system itself moves and deposits huge quantities of silt as part of its natural processes. The addition of small amount of additional silt would have negligible effect on the integrity of the National Site Network.

8.9.4 Additional impacts during construction and decommissioning could include dust deposition during creation and removal of access tracks and vehicle tracking.

8.9.5 A detailed CEMP will be implemented which will include measures such as refuelling locations, use of spill kits and method statements detailing the construction of crossing points to avoid waterbody siltation. An oCEMP has been included within this PEIR (**Appendix 2A**). Initial method statements have been prepared for road construction and decommissioning, management of stockpiles and installation of cable trays across reens and are being finalised for ES. These detail sensitive working practices including marking out buffer zones, installation of silt fences, dust control, storage of topsoil and reinstatement of habitats. Each crossing will be individually reviewed/surveyed during detailed design to confirm the crossing methodology employed. With the implementation of these documents the effects are negligible and are **Not Significant** at any geographic scale. In EIA terms this would

be **Negligible Not Significant.**

River Usk SAC

8.9.6 Water pollution is identified as a pressure and threat to the River Usk SAC. There is considered to be a very low risk of siltation, dust pollution or fuel/chemical spill affecting the SAC offsite during construction and decommissioning due to the inherent 12.5m and 7m buffer zones which are incorporated around reens and ditches, other than at crossing locations (see below).

8.9.7 Some operations such as hedge cutting and new cable/ vehicular crossing point installation will take place prior to construction where there is an increased risk of minor pollution incidents, in particular increased siltation to the watercourses. However, if an accidental pollution event or siltation was to occur, it is likely to be small, very localised and isolated. Similar effects could occur during decommissioning when infrastructure is removed. The Proposed Development lies within potential territories of otter associated with the SAC (a notified feature) and there is therefore potential for minor silt or fuel pollution via the reen network impacting otter as part of functionally linked land.

8.9.8 As detailed for the Severn Estuary above, a detailed CEMP will be implemented detailing pollution prevention measures. An oCEMP has been included within this PEIR (**Appendix 2A**). Method statements for the installation of culverts and bridges will detail measures to prevent siltation. Each crossing will be individually reviewed/surveyed during the detailed design to confirm the crossing methodology employed. With the implementation of these documents the effects are negligible and are **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

8.9.9 The installation of culverts and bridges within onsite reens and ditches could impact otter holts/ resting places either directly or via disturbance (see also paragraphs 8.8.58 - 8.8.61) This could result in the loss of individual otter territories due to displacement to other areas, or the abandonment of pups if close to a natal den. To mitigate, a pre-works check will be undertaken covering crossing points and suitable otter holt-building habitat within 100m with culvert/ bridge locations. If otter are likely

to be impacted directly or through disturbance, crossing points will be re-sited to a new, less disturbing location. Similarly, prior to decommissioning a survey will be undertaken to reassess any potential effects. If this is not achievable, a European Protected Species (EPS) mitigation licence may be required. Method statements will detail measures to reduce disturbance such as noise in proximity to holts. The culvert design will be agreed with an ecologist prior to works to ensure that otters can continue to use the watercourse network. Refer to **Appendix 8I** for further detail. With these measures the effect would be negligible and **Not Significant** at the National scale (see also Otter below). In EIA terms this would be **Negligible Not Significant.**

8.9.10 No night-time construction/ decommissioning activities are proposed therefore impacts on commuting and foraging otter will not occur and this is considered negligible and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.** See also paragraphs 8.8.58 - 8.8.6.

Gwent Levels (covering Magor and Undy SSSI, Redwick and Llandevenny SSSI, Whitson SSSI and Nash and Goldcliff SSSI)

8.9.11 The special interests of the SSSI are primarily dependent on water quality, water quantity, the drainage regime and management regime of both the drains and field. Potential effects regarding run-off and hydrological issues are addressed in **Chapter 10: Water Environment**.

8.9.12 The Proposed Development will not result in the direct loss of the notified features of the SSSI (reens/ ditches/ invertebrate habitat) as buffers have been designed in to avoid them to ensure continuous connectivity of water habitats. However, the construction phase will result in temporary disturbance to SSSI supporting habitats e.g. piled installation of Solar Panels, access tracks and cable installation. This is highly unlikely to physically impact the notified reen features other than at crossing points but may result in indirect effects e.g. pollution. Similar effects could occur during decommissioning when infrastructure is removed.

8.9.13 There is potential for siltation during the construction and decommissioning phases where works are undertaken close to the ditch and reen network, as well as at cable

and access track crossing locations where they pass over the ditch network, although most likely at a very localised scale.

8.9.14 A detailed CEMP will be implemented which will include measures such as refuelling locations, use of spill kits and method statements detailing the construction of crossing points to avoid waterbody siltation. An oCEMP has been included within this PEIR (**Appendix 2A**). Initial method statements have been prepared for road construction and decommissioning, management of stockpiles and installation of cable trays across reens and are being finalised for ES. These detail sensitive working practices including marking out buffer zones, installation of silt fences, dust control, storage of topsoil and reinstatement of habitats. Each crossing will be individually reviewed/surveyed during detailed design to confirm the crossing methodology employed. With the implementation of these documents the effects are negligible and are **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

8.9.15 The installation and removal of cable bridges has the potential to temporarily affect SSSI qualifying feature shrill carder bee due to habitat impacts/ loss, which will temporarily reduce foraging resources within reen/ ditch margins. The construction of new vehicular crossings and access tracks would result in a permanent loss. These temporary and permanent effects could occur to up to 4.65km of marginal/ bankside vegetation of varying widths which require cable/ vehicular crossing, if foraging plants are present at the time (e.g. clovers, vetches, labiates (e.g. marsh woundwort), knapweeds and thistles). Although shrill carder bee have only been recorded within the field boundaries of Fields 248, 133, 160, 503 and 187 (refer to **Appendix 8G**), their presence at the time of impact will depend on the habitat quality and presence of suitable food plants and therefore on a precautionary basis it is assumed they could be present at any crossing point. On this basis, up to 4.65km of loss, within margins on average being 3m wide from the toe of the bank, the amount of habitat lost equates to 1.395ha.

8.9.16 Four of the fields where shrill carder bee have been previously recorded will be panelled however as the records were limited to reen/ ditch buffers where food plants were found, the undisturbed 7m and 12.5m buffers will provide alternative areas for

foraging and reproduction during the installation of panels and creation of reen/ ditch crossings. One field where shrill carder bee were recorded (Field 160) will be excluded from construction and retained for the lifetime of the project (c. 9.3ha). With the provision of buffers and the retention of Field 160, effects are considered negligible and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant**.

Magor Marsh SSSI

8.9.17 No impacts are predicted on this site as it is located 0.8km north (upstream) of the Proposed Development. In any case embedded design measures which includes 7m and 12.5m buffers around ditches and main reens respectively, would reduce/ prevent siltation or accidental spillage within any connected watercourses. This will be further assessed within the ES following final details of water quality impacts. Effects are therefore considered negligible and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

8.9.18 Potential effects regarding run-off and hydrological issues are addressed in **Chapter 10: Water Environment**.

Newport Wetlands SSSI/ NNR

8.9.19 No impacts are predicted on this site as it is located 1.1km west of the Proposed Development. Embedded design measures which includes 7m and 12.5m buffers around ditches and main reens respectively, which would reduce/ prevent siltation or accidental spillage within any connected watercourses. This will be further assessed within the ES following final details of water quality impacts. Effects are therefore considered negligible and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

8.9.20 Potential effects regarding hydrological issues are addressed in **PEIR Chapter 10 Water Environment**.

Non-statutory designated sites

8.9.21 Potential effects on these offsite designations relate to pollution, where they are linked via the reen/ ditch network. However, with the implementation of the detailed

CEMP, which will include measures such as refuelling locations, use of spill kits and method statements detailing the construction of crossing points to avoid waterbody siltation effects are likely to be mitigated. An oCEMP has been included within this PEIR (**Appendix 2A**). Initial method statements have been prepared for road construction and decommissioning, management of stockpiles and installation of cable trays across reens and are being finalised for ES. These detail sensitive working practices including marking out buffer zones, installation of silt fences, dust control, storage of topsoil and reinstatement of habitats. With the implementation of these documents the effects are negligible and are **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

8.9.22 Potential effects regarding run-off and hydrological issues are addressed in **Chapter 10 Water Environment**.

Coastal and Floodplain Grazing Marsh (CFGM)

8.9.23 The Grid Connection Infrastructure associated with the Proposed Development will result in a permanent land take of land currently occupied by semi-improved grassland and poor semi-improved grassland (which collectively, along with the watercourses, form the priority and Local BAP habitat coastal and floodplain grazing marsh), as well as tall ruderal vegetation and scrub. The amount lost is not available at present and will be assessed as part of the ES, however all proposed options lie within land with CFGM characteristics. Option 1 is likely to have the largest impact due to the construction of compounds north of the Whitson substation, which lies within semi-improved grassland, and is of higher botanical diversity then the more southerly fields.

8.9.24 Solar Panels individually have a relatively small footprint; however, installation of the proposed PV Arrays through the temporary (for the lifetime of the development) piled footings (1.14ha total across the Site), new permanent access tracks (2.29ha) and minor widening of existing access tracks (5.5km) will require land take of a small proportion of the field habitats and the majority will be within low diversity improved grassland. In addition, transformers/ coupler stations will require the removal of c.0.03ha. Where possible cabling will be routed underground through more sensitive

habitat. Where trenching is required, soil layers will be separated and replaced in the correct order so that the habitat can regenerate naturally. Method statements will be provided as part of the detailed CEMP.

8.9.25 Cable installation between the PV Arrays and the Grid Connection Infrastructure will result in temporary impacts to coastal and floodplain grazing marsh, including areas of semi-improved grassland and marshy grassland, especially in the locality of the National Grid substation. Further temporary impacts will occur due to the construction of HDD compounds (7.99ha) and temporary construction compounds (5.5ha).

8.9.26 Approximately 51.5ha of coastal and floodplain grazing marsh will be retained without PV Arrays as part of the bird mitigation fields, which will be enhanced in accordance with a LEMP. Outline management objectives are provided in the oLEMP (**Appendix 8J**). 7m and 12.5m reen/ditch buffers will similarly be managed to promote plant diversity and structure, either through grazing or cutting

8.9.27 During decommissioning, this process will be reversed, with infrastructure being removed and land being returned to its original habitat type.

8.9.28 There is potential for rutting and compaction in wet weather from site vehicles during both construction and decommissioning. However, soil compaction will be minimised in sensitive habitats (e.g. marshy grassland) to preserve soil structure, using ground protection mats.

8.9.29 To mitigate for permanent losses, large areas of mitigation land (51.5ha) will be enhanced to restore high quality coastal and floodplain grazing marsh. This will involve low-level grazing to maintain plant diversity and open conditions, preferably with cattle which produce a more varied tussocky structure than sheep. Existing arable fields will be reverted to a diverse grassland mixture, suitable to the ground conditions and locality.

8.9.30 Overall, impacts on CFGM due to the overall loss of an HPI are considered to be adverse and **Significant** at the Local scale. In EIA terms this would be **Minor Not Significant.**

Wet reens/ ditches

8.9.31 The Proposed Development will not result in the direct loss of reens and ditches as it has been designed such that no removal of reens or ditches is required (e.g. using bridges, culverts and HDD to retain the waterbody). However, there will be localised impacts from cable and access track crossings (e.g. culverts and bridges) which would have temporary impacts on the channel and banks during both installation and removal as part of decommissioning.

8.9.32 There is potential for siltation and pollution during the construction and decommissioning if works are undertaken close to the ditch and reen network, as well as at cable crossing locations where they pass over the ditch network, although most likely at a very localised scale. Embedded measures, as set out in **Section 8.8**, includes 7m and 12.5m buffers around ditches and main reens respectively, therefore there is a very low risk of any siltation or accidental spillage during panel installation causing pollution in reens and ditches, as long as these buffers remain vegetated to slow/ capture run-off.

8.9.33 The detailed CEMP will include measures such as refuelling locations, use of spill kits and method statements detailing the construction of crossing points to avoid waterbody siltation. An oCEMP has been included within this PEIR (**Appendix 2A**). Initial method statements have been prepared for road construction and decommissioning, management of stockpiles and installation of cable trays across reens and are being finalised for ES. These detail sensitive working practices include marking out buffer zones, installation of silt fences, dust control, storage of topsoil and reinstatement of habitats. Each crossing will be individually reviewed/surveyed during detailed design to confirm the crossing methodology employed.

8.9.34 Furthermore, ecological enhancement of selected reens/ ditches through hedgerow removal (southern hedge of double hedgerow), desilting and reprofiling will compensate for any losses of marginal vegetation at bridge/ culvert locations.

8.9.35 With the implementation of these measures in combination with the lack of direct loss of habitat, the effects are negligible and are Not Significant. In EIA terms this would be **Negligible Not Significant** at any geographic scale.

8.9.36 Potential effects regarding run-off and hydrological issues are addressed in **Chapter 10 Water Environment**.

Hedgerows

8.9.37 Permanent removal of multiple short sections of species-poor hedgerows will be required to create new vehicle access points and cable crossings. Through the design process to date this has been minimised to only necessary amounts being removed, however cumulatively this could result in a substantial amount of up to 2.04km for trenches/ cable bridges and 2.61km for access track crossings. A fully detailed Tree Survey and Arboricultural Impact Assessment (AIA) is currently being carried out in order to fully establish the characteristics of the habitats in the field boundaries, alongside the reens and ditches. From observations made on site it is recognised that not all reens and ditches have tree and hedgerow habitat alongside them, therefore the length of hedgerow loss is likely to be far less. It is also proposed that the locations of all crossings would be carefully micro-sited so as to avoid hedgerow and to utilise any natural breaks in higher quality habitat on the bankside. On this basis the amount of hedgerow loss will continue to be minimised through the on-going design process resulting in a far lower figure than the precautionary one provided in this PEIR document.

8.9.38 It should also be noted that hedgerows are not always considered desirable from a conservation perspective in this landscape and that multiple NRW management plans for the area recommend hedge removal, so whilst the cumulative amount of hedge being lost is considered significant in the context of it being viewed as a standalone habitat, the losses have far less ecological significance within the Site's setting.

8.9.39 Furthermore, the existing hedgerow onsite equates to over 73km (when taking double hedgerows into account this is closer to 114km) and therefore the amount lost is relatively small comparative to the amount retained. All other hedgerows within the Site will be protected from damage or removal via the inherent 7m and 12.5m buffer zones designed in. Measures to avoid or reduce the risk of accidental encroachment will be set out in the detailed CEMP. Method statements will be

employed to ensure that the minimum length required will be removed.

8.9.40 To compensate for losses, a suite of measures will be designed to enhance retained hedgerows across the site, including gapping up of defunct hedgerows with a diverse mixture of whips and a Landscape and Ecological Management Plan (LEMP) to ensure ongoing management focuses on restoring dense, continuous hedgerows. If appropriate, new hedgerows will be planted where they do not cause shading of watercourses or solar panels. An outline LEMP (oLEMP) is provided with the application (**Appendix 8J**).

8.9.41 Impacts associated with losses of hedgerow in relation to their function of being a place of shelter for breeding, resting and feeding for wildlife will be compensated through the creation of scrub at multiple locations across the Site and is covered in more detail in the sections below on fauna.

8.9.42 No hedgerow removal is proposed during decommissioning.

8.9.43 The loss of hedgerow (based on a worst-case scenario of 4.65km) is considered to be **Significant** at a **Local** scale, although this is subject to further review once details of final crossings are made available. In EIA terms this would be **Minor Not Significant**.

Roosting bats

8.9.44 There are no likely significant effects predicted to roosts during the construction and decommissioning as no trees with any potential bat roosting features will be removed.

8.9.45 As described in **Chapter 2: Description of the Proposed Development**, construction works will be undertaken under normal daylight, with artificial illumination only required for individual tasks or within compounds where lighting would be positioned at low level on posts / tripods and directed at the most frequently used areas of work. Inward facing security lighting would be provided at temporary construction compounds on a 24 hour basis. There is a very small chance of light spill falling upon tree roosts. However, the detailed CEMP will detail methods to ensure that any onsite lighting will be directed away from any of the identified trees

with bat roost potential. Cowled lighting would be used to minimise light spill beyond site compounds.

8.9.46 7 – 12.5m buffers to reens/ ditches means that accidental damage to trees by machinery during construction/ decommissioning is unlikely to occur and measures to avoid or reduce the risk of accidental encroachment during ditch/ hedgerow crossings will be set out in the detailed CEMP.

8.9.47 With the implementation of these measures the effects are negligible and are **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Commuting/ foraging bats

8.9.48 As described in **Chapter 2: Description of the Proposed Development**, construction works will be undertaken under normal daylight, with artificial illumination only required for individual tasks or within compounds where lighting would be positioned at low level on posts / tripods and directed at the most frequently used areas of work. Inward facing security lighting would be provided at temporary construction compounds on a 24 hour basis. There is a small chance of light spill falling upon bat commuting/ foraging routes. However, the detailed CEMP will set out methods to ensure that any onsite lighting will be directed away from the 7m and 12.5m ditch/reen buffers which offer highest potential for commuting/ foraging and cowled lighting would be used to minimise light spill beyond site compounds.

8.9.49 Whilst the hedgerow network, which is the primary feature for commuting/ foraging bats, is being buffered by the 7m and 12.5m ditch/ reen buffers (providing unfragmented foraging habitat), there are many small sections of hedgerow requiring removal for cable and access track crossings, which cumulatively could result in up to 4.65km being removed across the Proposed Development. Linear habitats such as hedgerows, tree lines and ditches are important foraging habitats and provide linear commuting habitat for many bat species which will not fly across open areas. A fully detailed Tree Survey and Arboricultural Impact Assessment (AIA) is currently being carried out in order to fully establish the characteristics of the habitats in the field boundaries, alongside the reens and ditches. From observations made on site

it is recognised that not all reens and ditches have tree and hedgerow habitat alongside them, therefore this length is likely to be far less. It is also proposed that the locations of all crossings would be carefully micro-sited so as to avoid hedgerow and to utilise any natural breaks in higher quality habitat on the bankside. On this basis the amount of hedgerow loss would be further minimised through the evolving design process.

8.9.50 Taking into account the worst-case scenario of 4.65km the hedgerow loss could result in habitat fragmentation with bats avoiding gaps, leading to longer flight routes and increased energetic demand. However the majority of the proposed gaps are below 5m, which has been shown to be acceptable to rare species such as horseshoe bats which are known to avoid gaps (Ref 8-43). Although the exact details of hedgerow removal is not yet known, it is envisaged that crossings will be micro-sited to utilise natural breaks in hedgerows, reducing any fragmentation effects of larger gaps by ensuring that connectivity is maintained via an alternative route. The effects are therefore considered adverse at the Site level and are **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Amphibians (great crested newts)

8.9.51 A single offsite pond (c. 57m from the PEIR Assessment Boundary, see **Appendix 8D**, Figure 8.4.1) which supports a small GCN population will not be directly impacted by the Proposed Development. There are no pathways for indirect impacts during construction or decommissioning, such as linked watercourses.

8.9.52 Although it is known that GCN can disperse up to 500m through suitable terrestrial habitat from their breeding pond during their terrestrial life stages, it is widely accepted that they tend to utilise suitable terrestrial habitat within a much closer distance, e.g. 250m (Ref 8-44). The habitats around the pond which are likely used by GCN include hedgerow bases, ditch margins where suitable refugia may be found, and modified grassland fields for foraging during hours of darkness.

8.9.53 The Proposed Development will result in the loss of no habitat within close proximity of the pond (<50m), however grassland will be lost or temporarily damaged within intermediate habitats (up to 250m), as well as arable habitat which will be converted

to a grassland type below proposed panels. Beyond 250m, given the existing low value of terrestrial habitat and the retention of hedgerows/ watercourses with buffers, no significant impacts are predicted, as the availability of commuting habitats is likely to remain relatively consistent.

8.9.54 The majority of the hedgerows within 250m of this off-site pond will be retained along with the reen/ ditch buffer of 7 – 12.5m which will be protected, however cable crossings will be constructed 100 – 150m from the pond which will result in hedgerow removal to construct bridges and in some cases a culvert across the reen. This has the potential to result in injury and mortality during construction if resting places are impacted, as well as short-term habitat fragmentation at the time of cable crossing creation. Similar impacts could occur during decommissioning, during the removal of infrastructure. GCN are likely to cross reinstated habitat and access tracks post-construction.

8.9.55 There is a risk that GCN could fall into any open cabling trenches at night while foraging. Given that no construction/ decommissioning activities will take place during the hours of darkness, the risks of direct death or injury to newts within fields is extremely low, as they are unlikely to be moving across areas of impact in daylight hours. Any works done to facilitate new crossings would also be carefully undertaken, under the supervision of an ECoW in order to mitigate such impacts.

8.9.56 As described in **Chapter 2: Description of the Proposed Development**, construction works will be undertaken under normal daylight, with artificial illumination only required for individual tasks or within compounds where lighting would be positioned at low level on posts / tripods and directed at the most frequently used areas of work. Inward facing security lighting would be provided at temporary construction compounds on a 24 hour basis. There is a small chance of light spill falling upon GCN commuting/ foraging routes. However, the oCEMP will detail methods to ensure that any onsite lighting will be directed away from the 7m and 12.5m ditch/main reen buffers and associated hedgerow bases which offer highest potential for GCN and cowled lighting would be used to minimise light spill beyond site compounds.

8.9.57 To mitigate adverse effects, works within 250m of the confirmed GCN pond will be undertaken in accordance with an NRW mitigation licence; this will include a detailed method statement, detailing timings of when works can take place to avoid impacts on commuting and hibernating GCN. It is considered unlikely that pitfall trapping will be realistic on Site due to the presence of reens and ditches. However given the small population present and low chance of offences occurring, alternative methods are considered suitable such as fingertip searches of hedgerow bases/ ditch margins in areas of works and no night time working within modified grassland fields.

8.9.58 Any open trenches left overnight within 250m of the pond will be checked in the morning prior to any filling in by the licensed project ecologist. Any amphibians found would be moved to a safe location in accordance with the licence.

8.9.59 Habitat enhancement will be undertaken in accordance with the licence, to include rough grassland and habitat piles/ hibernacula linking the offsite pond to the new bird mitigation fields to the south-west. Options to create a new pond/s will be explored within 300m of the existing population, located in reen buffers or the bird mitigation fields, in accordance with the Great Crested Newt Conservation Handbook (Ref 8-44).

8.9.60 With the mitigation measures detailed above, effects on the GCN population during terrestrial life stages will be negligible and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Dormice

8.9.61 During hedgerow removal there are risks associated with killing/ injury of dormice, loss of nest sites and reduction in foraging habitat (up to 4.65km of hedgerow being removed). Sensitive clearance methods, detailed within the detailed CEMP and a dormouse mitigation licence will protect dormice from harm during removal of woody habitat.

8.9.62 Habitat replacement, on a minimum area ratio of 1:1 will be undertaken and where suitable, enhancement of retained hedgerows with suitable native species will be undertaken, to be detailed within a LEMP (oLEMP submitted as part of PEIR

Appendix 8J). New habitat creation for dormice will be created within the same season as the loss to maintain and enhance connectivity to ensure that dormice can continue to move around the Site. This will include scrub planting in several areas close to existing known populations on Site, and close to the southern boundary, connecting numerous hedgerows and providing a substantial linear network of suitable commuting, foraging and shelter habitat.

8.9.63 Dormouse nest boxes will be installed to further mitigate for loss of nesting habitat, whilst new habitat establishes. Final numbers and locations will be agreed in the NRW mitigation licence. The above measures will ensure that the effects on habitat loss are negligible and **Not Significant** above the Site scale. In EIA terms this would be **Negligible Not Significant.**

8.9.64 The main hedgerows where dormouse were found west of Redwick are being retained, with any cable crossings being directionally drilled below hedgerows to maintain connectivity. Multiple short sections of hedgerow will be removed in the wider hedgerow network (totalling up to 4.65km) which may result in fragmentation effects. However evidence suggests that dormouse would cross 10-30m of hard standing/ open ground and potentially further over grassland (Ref 8-45). Furthermore a fully detailed Tree Survey and Arboricultural Impact Assessment (AIA) is currently being carried out in order to fully establish the characteristics of the habitats in the field boundaries, alongside the reens and ditches. From observations made on-site it is recognised that not all reens and ditches have tree and hedgerow habitat alongside them, therefore this length is likely to be far less. It is also proposed that the locations of all crossings would be carefully micro-sited so as to avoid hedgerow and to utilise any natural breaks in higher quality habitat on the bankside. On this basis the amount of hedgerow loss would continue to be minimised through the evolving design process. therefore for the majority of hedgerow breaks, fragmentation effects will be **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

8.9.65 During decommissioning, removed sections of hedgerow will be restored where possible.

Otter

8.9.66 Evidence of otter has been found during the surveys on-site, with more frequent use recorded on main reens, although it is likely that they use the reen and ditch system on the Site for commuting as part of a wider territory.

8.9.67 The construction of cable crossings (including culverts, bridges and entry/ exit compounds for HDD) could have adverse effects which could include avoidance behaviour and disturbance (e.g. noise) if close to a holt. This will be assessed as part of the ES, with updated survey information. There is potential for this effect to be **Significant** at the National scale In EIA terms this would be **Major Significant.**

8.9.68 If a holt is within the located of a reen/ ditch crossing, there could be direct impacts to a holt. To mitigate, a pre-works check will be undertaken covering crossing points and suitable otter holt-building habitat within 100m with culvert/ bridge locations. If otter are likely to be impacted directly or through disturbance, crossing points will be re-sited to a new, less disturbing location. Similarly, prior to decommissioning a survey will be undertaken to reassess any potential effects. If this is not achievable, a European Protected Species (EPS) mitigation licence may be required. Method statements presented in the detailed CEMP will set out measures to reduce disturbance such as noise in proximity to holts. The culvert design will be agreed with an ecologist prior to works to ensure that otters can continue to use the watercourse network. Refer to **Appendix 8I** for further detail. With these measures the effect would be negligible and **Not Significant** at the National scale. In EIA terms this would be **Negligible Not Significant.**

8.9.69 Otters are usually crepuscular and nocturnal, and embedded measures of 7m and 12.5m buffers along ditch/main reen boundaries will reduce any effects of disturbance to commuting and foraging. As described in **Chapter 2: Description of the Proposed Development**, construction works will be undertaken under normal daylight, with artificial illumination only required for individual tasks or within compounds where lighting would be positioned at low level on posts / tripods and directed at the most frequently used areas of work. Inward facing security lighting would be provided at temporary construction compounds on a 24 hour basis. There

is a small chance of light spill falling upon reens/ ditches, however the detailed CEMP will set out methods to ensure that any onsite lighting will be directed away from the 7m and 12.5m ditch/main reen buffers and cowled lighting would be used to minimise light spill beyond site compounds.

8.9.70 There is the potential for otter to fall into open cabling trenches if moving over land, however the detailed CEMP will stipulate that any open trenches will be either covered at night or a means of escape such as a plank will be placed inside. With these embedded measures impacts on otter from lighting and entrapment is considered to be **Negligible** and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Water vole

8.9.71 Water vole have not been recorded on-site in locations of impacts, although they are present within interconnected reens and on one reen within the PEIR Assessment boundary.

8.9.72 Potential impacts would only be at new crossing points where burrows could be affected by new bridge/culvert building, should they move onto the Site in the intervening period. A pre-works surveys of all ditch/reen crossing points will be undertaken in case water vole have taken up residence in the interim period as part of embedded measures within the detailed CEMP, and where possible crossings micro-sited to avoid and buffer active burrows.

8.9.73 Similarly, prior to decommissioning a survey will be undertaken to reassess any potential effects. An Ecological Clerk of Works (ECoW) will be present during construction/ decommissioning in any identified sensitive areas, and 10m buffers marked out where the crossing point cannot be micro-sited.

8.9.74 Where buffering of 10m cannot be achieved, there is the potential for water vole burrows to be directly impacted, or for water vole to be disturbed whilst within a burrow. This effect could be **Significant** at the Local scale. *I*n EIA terms this would be **Minor Not Significant.**

Aquatic invertebrates

8.9.75 The Proposed Development will maintain a minimum of a 7m standoff from any ditches and a 12.5m standoff from any main reens, therefore direct impacts to aquatic invertebrates are considered unlikely (see also Reens and Ditches above).

8.9.76 A detailed CEMP will be implemented which will include measures such as refuelling locations, use of spill kits and method statements detailing the construction of crossing points to avoid waterbody siltation. An oCEMP has been included within this PEIR (**Appendix 2A**). Initial method statements have been prepared for road construction and decommissioning, management of stockpiles and installation of cable trays across reens and are being finalised for ES. These detail sensitive working practices including marking out buffer zones, installation of silt fences, dust control, storage of topsoil and reinstatement of habitats. Each crossing will be individually reviewed/surveyed during detailed design to confirm the crossing methodology employed.

8.9.77 With the implementation of these measures the effects are negligible and are **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Terrestrial invertebrates including shrill carder bee

8.9.78 No significant effects have been identified during the construction process with ditch and main reen buffers of 7m and 12.5m respectively being maintained, protecting the most valuable grassland habitats for terrestrial invertebrates. A detailed CEMP will be implemented which will include measures such as refuelling locations, use of spill kits and method statements detailing the construction of crossing points to avoid waterbody siltation. An oCEMP has been included within this PEIR (**Appendix 2A**). Initial method statements have been prepared for road construction and decommissioning, management of stockpiles and installation of cable trays across reens and are being finalised for ES. These detail sensitive working practices including marking out buffer zones, installation of silt fences, dust control, storage of topsoil and reinstatement of habitats. Each crossing will be individually reviewed/surveyed during detailed design to confirm the crossing methodology employed.

8.9.79 There will be short term, reversible impacts during the creation of cable and access track crossings which will temporarily reduce foraging resources within reen/ ditch margins. For shrill carder bee, this could occur where foraging plants are present (e.g. clovers, vetches, labiates (e.g. marsh woundwort), knapweeds and thistles) and within the field boundaries where they have previously been recorded (Fields 248, 133, 160, 503 and 187, refer to **Appendix 8G**), although their presence will depend on the habitat quality at the time of impact. Four of these fields will be panelled however as the records were limited to reen/ ditch buffers where food plants were found, the undisturbed 7m and 12.5m buffers will provide alternative areas for foraging and reproduction during the installation of panels and creation of reen/ ditch crossings.

8.9.80 A fifth field (Field 160: 9.3ha) in which shrill carder bee were recorded will be retained and enhanced as mitigation land (see Operational Phase below).

8.9.81 Similar effects are predicted during the decommissioning phase during the removal of infrastructure.

8.9.82 The majority of the fields being lost to Solar Panels are of low value to terrestrial invertebrates, and it is considered that the grassland will still be available for foraging. Some higher value fields such as semi-improved grassland may become degraded during construction; however the higher value buffers will be available for the duration.

8.9.83 During decommissioning, all habitats will be returned to the original habitat type following the removal of panels and infrastructure.

8.9.84 With the implementation of the embedded mitigation measures, effects are considered **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Reptiles

8.9.85 Small scale removal of habitat at reen crossings where longer grass or refuges may be present could result in direct killing/ injury of reptiles during construction. To mitigate, an Ecological Clerk of Works will be present during the removal of suitable

habitat, which will be set out in the detailed CEMP. This will include a hand search of any refuges and any reptiles moved to a place of safety.

8.9.86 Habitat fragmentation may occur as result of new access tracks.

8.9.87 During decommissioning, similar effects could occur during the removal of infrastructure.

8.9.88 Given the small proportion of crossings compared to the remaining buffers that will be available, these effects are considered **Significant** at the **Site** level In EIA terms this would be **Negligible Not Significant.**

European eel and fish

8.9.89 The Proposed Development will maintain a minimum of a 7m standoff from any ditches and a 12.5m standoff from any main reens, therefore direct impacts to European eel and fish during the majority of construction and decommissioning operations are considered unlikely.

8.9.90 There is a risk of localised effects from pollution and minor siltation associated with the installation of ditch/reen crossings, bridges and culverting works. This could effect supporting habitat and result in poor foraging or shelter habitat. A detailed CEMP will be implemented which will include measures such as refuelling locations, use of spill kits and method statements detailing the construction of crossing points to avoid waterbody siltation. An oCEMP has been included within this PEIR (**Appendix 2A**). Initial method statements have been prepared for road construction and decommissioning, management of stockpiles and installation of cable trays across reens and are being finalised for ES. These detail sensitive working practices including marking out buffer zones, installation of silt fences, dust control, storage of topsoil and reinstatement of habitats. Each crossing will be individually reviewed/surveyed during detailed design to confirm the crossing methodology employed to avoid direct impacts to species.

8.9.91 During decommissioning, similar effects could occur during the removal of infrastructure.

8.9.92 With the implementation of the above measures, effects are considered to be **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Badger

8.9.93 A single active sett located offsite but close to the PEIR Assessment Boundary, could be impacted by disturbance (e.g. vibration from piling) or excavations directly impacting tunnels. An inactive sett is located within a mitigation field and will therefore not be impacted.

8.9.94 Adverse effects to badgers themselves during the construction phase are limited to potential for entrapment in excavations if they are crossing the Proposed Development site at night to commute or forage. Measures to avoid or reduce the risk of accidental encroachment on setts or entrapment of individual badgers during construction will be set out in the CEMP.

8.9.95 As setts can be created at any time there is also the risk of setts being located in areas of impact prior to works commencing. Updated badger surveys will be carried out prior to the start of the construction and decommissioning phase to identify any additional setts present within or adjacent to the construction areas. This will be set out in the detailed CEMP/ decommissioning plan. The locations of any setts will be considered and either retained with an appropriate buffer or individual setts will be closed under an appropriate licence.

8.9.96 Effects during decommissioning will be similar to the above during the removal of infrastructure.

8.9.97 Effects could be **Significant** at the **Site** level. In EIA terms this would be **Negligible Not Significant.**

Hedgehog

8.9.98 Adverse effects during the construction and decommissioning phase are limited to potential for entrapment in excavations. However the detailed CEMP will stipulate that any open trenches will be either covered at night or a means of escape such as

a plank will be placed inside and therefore effects are considered negligible and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Brown hare

8.9.99 As grassland will be retained below panels, it is not anticipated that there will be a significant loss of habitat for brown hare. Construction and decommissioning effects are limited to temporary displacement from fields due to noise/ visual disturbance and potential for entrapment in excavations. The detailed CEMP will stipulate that any open trenches will be either covered at night or a means of escape such as a plank will be placed inside.

8.9.100 The development will take place in phases, ensuring that habitat is always available for brown hare. Effects are considered negligible and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Operational Phase

Severn Estuary Ramsar/ SAC/ SSSI

8.9.101 Changes in land use/ management could impact the notified/ qualifying features of the Severn Estuary via the reen/ ditch network. This is likely to be beneficial due to reduction in agricultural impacts and grazing pressure, which will reduce fertilisers and pesticides entering the estuary which cause nutrient imbalance. Cessation of ploughing arable fields and reversion to grassland will also reduce siltation and run off entering the reen/ ditch network which could reduce suspended particles entering the estuary. This is considered to be beneficial, however given the scale of the estuary and the large catchment area, the effect will be negligible and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

8.9.102 Potential effects regarding run-off and hydrological issues are addressed in **Chapter 10: Water Environment**.

River Usk SAC

8.9.103 As no night-time lighting is proposed and with the provision of the inherent reen/ ditch buffers, disturbance to otters within functionally linked land during operation is considered very low risk. Emergency works may require vehicles and lighting at night, although this is unlikely to be frequent or for extended periods.

8.9.104 Whilst the culverts and bridges for cable crossings have the potential to restrict commuting/ foraging routes due to avoidance behaviours, these structures will be short in length and there is no risk of road traffic collision if otters leave the watercourse to avoid the culvert given that night-time maintenance is unlikely and vehicle speeds will be low. Any bridge will span the watercourse to reduce impacts to bankside vegetation. This is not considered to give rise to significant effects. Fencing within fields could prevent otters crossing terrestrial habitat.

8.9.105 Regular annual/biannual hedge cutting would take place, as well as regular ditch and reen management practices that already takes place on major reens and ditches on Site by NRW. This is not considered to give rise to adverse effects on the integrity of the National Site Network as it would not be above current management levels. Rather, beneficial effects could occur through the opening up of shaded ditches, desilting and reprofiling of banks to increase water quality and quantity.

8.9.106 The installation of the Solar Panels will change some fields from arable to grassland which will have a beneficial effect of reducing the amount of silt entering reens across the Site during ploughing operations. Furthermore a reduction in grazing is likely to result in an overall beneficial effect on water quality due to reduced agricultural inputs which could have beneficial effects on otter.

8.9.107 Overall effects on the River Usk SAC are considered to be beneficial but **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Gwent Levels (covering Magor and Undy SSSI, Redwick and Llandevenny SSSI, Whitson SSSI and Nash and Goldcliff SSSI)

8.9.108 Potential effects regarding run-off and hydrological issues on the notified features of the SSSI are addressed in **Chapter 10: Water Environment**.

8.9.109 The Grid Connection Infrastructure would be subject to a drainage strategy to ensure a greenfield runoff response, with infrastructure mounted over permeable gravel base.

8.9.110 There is potential for beneficial effects to the SSSI notified features as a result of the Proposed Development during operation depending on the management practices undertaken.

8.9.111 The Proposed Development will reverse the degradation of the SSSI by taking the land out of intensive farming use. The change in management by a reduction in grazing (detailed within the LEMP) will reduce soil compaction (which reduces infiltration), it will also eliminate fertilizer inputs. This will result in a beneficial effect by allowing the ground to vegetate naturally, the soil to improve and in turn improving the water quality entering the reen system as well as eliminating silt run off and creating a steadier flow into the reen system.

8.9.112 Beneficial effects will occur due to the removal of one side of double hedges to provide more sunlight to the reens and an improvement in water quality and quantity through de-siltation and bank reprofiling. The oLEMP (**Appendix 8J**) provides management objectives which will aim to restore habitat within reens/ ditches and within bank margins to benefit the aquatic habitat and invertebrates, flora and terrestrial invertebrates, with a focus on shrill carder bee requirements.

8.9.113 Additional measures will include desilting of ditches and reprofiling of banks to enhance this notified feature and increase opportunities for aquatic plants and invertebrates.

8.9.114 A seven-year reen management programme will be adopted during operation along with enhancements to reduce the double hedges on ditches and reens in order to open them up to more light. Existing open reen and ditches and single hedged ditches will be maintained as such, through an annual management programme or as appropriate. These measures will improve the reen habitats for the qualifying aquatic invertebrate species of the SSSIs, as well as the reens and ditches themselves, resulting in a long-term beneficial effect.

8.9.115 Buffers to all reens and ditches, which will be managed sensitively will create a resilient network of biologically rich habitat, that link to each other and watercourses within the wider area.

8.9.116 All management is to commence at the start of the Proposed Development.

8.9.117 The creation and management of a 'bee highway' adjacent to the southern boundary, totalling a length of c. 5.5km and a minimum of 10m wide, will link shrill carder bee sightings from previous survey work. This will be seeded with an appropriate late-flowering seed mix, details of which will be provided in the oLEMP. This will enhance the habitats for shrill carder bee and also benefit other bumble bee species, butterflies, moths and other wildlife.

8.9.118 Adverse effects could include reduction in poaching regime at reen margins which can be important microhabitats for invertebrates, or neglect of ditch management.

8.9.119 Effects during operation following the implementation of the above measures have the potential to have beneficial effects which could be **Significant** at the **National** scale, as the above measures have the potential to bring the qualifying features into favourable condition across a considerable area. In EIA terms this would be **Major Significant.**

Magor Marsh SSSI

8.9.120 No impacts are predicted during operation as the SSSI is located upstream of the Proposed Development. The operational phase will not result in air or water quality impacts. Effects are therefore considered negligible and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Newport Wetlands SSSI/ NNR

8.9.121 No impacts are predicted during operation as the SSSI is located upstream of the Proposed Development. The operational phase will not result in air or water quality impacts. Effects are therefore considered negligible and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Coastal and Floodplain Grazing Marsh

8.9.122 All permanent impacts (e.g. habitat loss) will have taken place during construction, therefore operational impacts are limited to ongoing maintenance.

8.9.123 Whilst degradation to grassland could occur below panels (149ha of land), the majority of fields are already low diversity and grassland will still persist under the PV Arrays, between blocks of panels, in rides and field margins/ buffers. The cessation of arable land uses and reversion to grassland will also increase the overall provision of CFGM.

8.9.124 There is potential for beneficial effects to the retained habitats as a result of the development depending on the management practices undertaken. Proposed objectives are provided within the oLEMP. The grassland will continue to be in low intensity agricultural use and specific sections will be managed through low density grazing or mowing with the aim of increasing structural and plant diversity across the application area. A seven-year reen management programme, along with enhancements to reduce the double hedges on ditches and reens in order to open them up to more light will further enhance Coastal and Floodplain Grazing Marsh.

8.9.125 This could result in beneficial effects, **Significant** at the Local scale. In EIA terms this would be **Minor Not Significant.**

8.9.126 Potential effects regarding run-off and hydrological issues are addressed in **Chapter 10: Water Environment**.

Wet reens/ ditches

8.9.127 Potential effects regarding run-off and hydrological issues on the watercourses during operation are addressed in **Chapter 10: Water Environment**.

8.9.128 The Grid Connection Infrastructure would be subject to a drainage strategy to ensure a greenfield runoff response, with infrastructure mounted over permeable gravel base.

8.9.129 There is potential for beneficial effects on the reens and ditches as a result of the Proposed Development during operation due to the reduction in agricultural practices and depending on the management practices undertaken. Proposed objectives are

provided within the oLEMP (**Appendix 8J**). The cessation of intensive farming use (e.g. grazing) and reversion of arable to grassland to reduce fertilizer and soil run-off into the watercourses will be implemented. This will include a seven-year reen management programme including de-siltation and bank reprofiling, along with enhancements to reduce the double hedges on ditches and reens in order to open them up to more sunlight. This will allow a more diverse aquatic flora. Existing open reen and ditches and single hedged ditches will be maintained as such, through an annual management programme or as appropriate.

8.9.130 Buffers to all reens and ditches, will be managed sensitively to create a resilient network of biologically rich habitat, that link to each other within the wider area.

8.9.131 This could result in beneficial effects, **Significant** at up to the National scale. In EIA terms this would be **Major Significant.**

Hedgerows

8.9.132 There will be an overall loss of hedgerow habitat across the Proposed Development during operation due to the reduction in double hedgerows to enhance reens.

8.9.133 Ongoing management could have a beneficial effect depending on the frequency and severity. Proposed objectives are provided within the oLEMP.

8.9.134 Whilst it is considered that there may be an overall loss in hedgerow length which would be a **Significant** adverse effect at the Local scale, NRW objectives to reduce shading of the reens/ ditches due to the unique ecology of the landscape mean that the benefit to the reens/ ditches and associated flora and fauna far outweighs the loss. In EIA terms this would be **Minor Not Significant.**

Commuting/ foraging bats

8.9.135 There are several ways in which solar farms are perceived to adversely affect bats:

- Loss of commuting and foraging habitat;
- Collision as a result of bats attempting to drink from the panels;
- Collision with vertically aligned panels.

8.9.136 A paper by Tinsley et al., (2023) (Ref 8-46) suggested that solar farms can have significant adverse effects on bat activity, with a reduction in activity, although no effect on species richness. The research suggests that mitigation may include ensuring boundary habitat is maintained and improved in its area and diversity, and ensuring appropriate planting to improve foraging resources for those species identified as being at risk from the development

8.9.137 There is a theoretical possibility that bats may collide with ground-mounted PV Arrays due to the way in which calls are reflected from the surfaces, or attempt to drink (Ref 8-47 and Ref 8-48). There are no studies that suggest that this occurs in the UK or that it is likely to significantly affect individual bats or populations. Further, a recent review of existing ecological impacts has suggested there is little evidence to support these effects (Ref 8-49). Another recent review of data relating to this subject by BSG (Ref 8-50) confirms that there has been no research that directly addresses the effect of PV solar facilities on bats. It concludes that bats can mistake horizontal surfaces for water bodies and vertical surfaces for open flight paths, although there is no evidence from the studies undertaken to date which suggest that this would result in collision with Solar Panels.

8.9.138 Most of the bat activity recorded within the application area was along the hedgerows, reens and field margins. There will be 7m and 12.5 m margins around fields so bats would still be able to commute and forage in these areas and drink from the reens, there will also be gaps and rides within the PV arrays (3m between rows) to break up the panel surfaces making it less likely to appear like a waterbody. In addition, the Solar Panels are not horizontal as those in the experimental studies, but at a fixed slope of between 15 to 25 degrees from horizontal, therefore it is not considered that bats would mistake panels as a water body.

8.9.139 The Proposed Development will include a number of habitat creation measures, managed via the LEMP, which will deliver a range of benefits for bats, including the provision of higher quality, connected habitat, for example the buffers to the retained hedgerows, reens and ditches, areas of scrub and rough grassland. Reversion of arable to grassland will create additional foraging habitat.

8.9.140 Artificial lighting will not be utilised during the operation of the Proposed Development.

8.9.141 This could result in beneficial effects, which would be **Significant** at the **Site** level. In EIA terms this would be **Negligible Not Significant.**

Amphibians (great crested newts)

8.9.142 No negative effects are predicted to GCN or other amphibian species during operation; the presence of panels within the fields should not have any significant effect to GCN if they were feeding in these areas at night as they would still be able to forage underneath the panels.

8.9.143 There is potential for beneficial effects as a result of long-term management practices undertaken. The Proposed Development will include a number of habitat creation measures, managed via the LEMP, which will deliver a range of benefits for amphibians, including the provision of higher quality, connected habitat, for example the 7m and 12.5m buffers to the retained hedgerows, reens and ditches, new pond/s, hibernacula/ habitat piles and connectivity to the bird mitigation fields via the reen/ ditch buffers which will provide higher value habitat than the arable and modified grassland which would have been present prior to the Proposed Development.

8.9.144 This could result in beneficial effects, which could be **Significant** at the Local scale. In EIA terms this would be **Minor Not Significant.**

Otter

8.9.145 The maintenance schedule for PV Arrays is likely to be less or no more disturbing for otter than current agricultural activity.

8.9.146 Whilst the culverts and bridges for cable crossings have the potential to restrict commuting/ foraging routes due to avoidance behaviours, these structures will be short in length and although there is a minor risk of road traffic collision if otters leave the watercourse to avoid the culvert, there will be low traffic numbers (if any) at night and low speeds. Any bridge will span the watercourse to reduce impacts to bankside vegetation. This is not considered to give rise to significant effects.

8.9.147 There may be some disturbance caused during on-going ditch and reen management although this is already a regularly disturbed site and the effects of this are considered negligible. There is potential for beneficial effects on the reens and ditches during operation, and therefore on foraging conditions for otter, due to the reduction in agricultural practices and depending on the management practices undertaken. Proposed objectives are provided within the oLEMP (**Appendix 8J**). The cessation of intensive farming use (e.g. grazing) and reversion of arable to grassland to reduce fertilizer and soil run-off into the watercourses will be implemented. This will include a seven-year reen management programme including de-siltation and bank reprofiling, along with enhancements to reduce the double hedges on ditches and reens.

8.9.148 Other operational impacts are limited to potential fragmentation of habitats due to fence installation, for otters crossing terrestrial habitat.

8.9.149 Effects on otter are considered to be beneficial which could be **Significant** at the Local scale. In EIA terms this would be **Minor Not Significant.**

Aquatic invertebrates

8.9.150 Laboratory-based research indicates that insects that lay eggs in water can mistake Solar Panels for water bodies due to reflection of polarised light (Ref 8-51). Species found in these experiments to be most attracted to panels were mayflies (*Ephemerotera*), stone flies (*Trichoptera*), dolichopodis, dipterans and tabanid flies. Most of these species are associated with fast flowing water rather than the slow or standing water present on Site.

8.9.151 The notable aquatic invertebrate species present on this site are made up of water/ diving beetles and a soldierfly species. These species do not have the same breeding strategy as mayflies and do not lay their eggs on open water surfaces, therefore should not be affected by this potential effect. There may be potential effects to species such as midges.

8.9.152 During operation, there is potential for beneficial effects as a result of long-term management practices undertaken, including the cessation of intensive agricultural

practices and the provision of a long-term ditch management plan. Improved hedge management and the removal of selected hedgerows to reduce ditch shading under the LEMP are likely to improve SSSI conditions for some invertebrate species.

8.9.153 Additional adverse effects could arise from the reduction of cattle poaching in the reen/ ditch margins, reducing the provision of shallow, muddy margins important to some key aquatic invertebrates. As part of the LEMP, cattle poached drinking areas beneficial to key invertebrate species will be monitored annually and if the reduced grazing/mowing regime is not maintaining these areas sufficiently then they will be artificially improved, by hand and/or mechanical means. These areas are also likely to benefit rare plant species such as tubular water dropwort which requires wet, unpolluted habitat with winter flooding and moderate levels of grazing.

8.9.154 Effects on aquatic invertebrates could be adverse and **Significant** at the Local scale. In EIA terms this would be **Minor Not Significant.**

Terrestrial invertebrates including shrill carder bee

8.9.155 The Proposed Development will result in the installation of Solar Panels within four fields in which shrill carder bee have been recorded (refer to **Appendix 8G**). These recordings were limited to reen buffers where food plants were also found and therefore with the provision of 7 – 12.5m buffers to ditches and main reens, these favoured locations will be retained in the long-term. Therefore no long-term fragmentation effects are anticipated to occur to shrill carder bee or other terrestrial invertebrates as a result of shading the grassland within the field. A fifth field in which shrill carder bee were recorded will be retained and enhanced as mitigation land.

8.9.156 For other terrestrial invertebrates, the panels will result in shading and a potential loss in food plants across several semi-improved grassland fields. Ewers *&* Didham (2006) (Ref 8-52) conclude that sedentary and specialist invertebrate species are more likely to be affected by habitat loss and fragmentation than more mobile and generalist species and that butterflies are widely acknowledged to be sensitive to habitat fragmentation. However further studies by Guiller *et al* (2017) (Ref 8-53) on the impacts on butterfly communities on a utility scale solar farm in France showed that both mobile and sedentary species coped with the changes in landscape

structure. Given their findings with species known to be sensitive to habitat fragmentation this suggests that more mobile species such as bees would not be significantly impacted by this change in landscape structure.

8.9.157 Improved hedge management and the removal of selected hedgerows to reduce ditch shading are likely to improve conditions for some invertebrate species (refer to oLEMP, **Appendix 8J**).

8.9.158 There is credible evidence to suggest that bumble bee and butterfly diversity can be higher at solar farm sites (Ref 8-54); this can be due to a change in grazing regime or the planting of wildflower seed mixes which could represent a significant positive effect on terrestrial invertebrates. Habitat improvements for invertebrates will be included in the Proposed Development as outlined in the oLEMP. This will include measures such as grassland within the 7 – 12.5m main reen and ditch buffers to be cut/grazed late in the season to improve plant species diversity and enhance their value to terrestrial invertebrates.

8.9.159 The creation and management of a 'bee highway' adjacent to the southern boundary, totalling a length of c. 5.5km and a minimum of 10m wide, will link shrill carder bee sightings from previous survey work. This will be seeded with an appropriate late-flowering seed mix, details of which will be provided in the LEMP. This will enhance the habitats for shrill carder bee and also benefit other bumble bee species, butterflies, moths and other wildlife.

8.9.160 During operation, there is potential for beneficial effects as a result of long-term management practices undertaken, in particular within the buffers.

8.9.161 Effects on terrestrial invertebrates could be beneficial and **Significant** at the Local scale. In EIA terms this would be **Minor Not Significant.**

Reptiles

8.9.162 Overall there will be no significant adverse effects in terms of habitat loss or fragmentation during operation. The Proposed Development will likely increase the availability and quality of habitat for reptiles due to the provision of wider buffers and the conversion of some arable fields to grassland, resulting in a beneficial effect of

significance up to a Site level.

8.9.163 There is potential for beneficial effects as a result of long-term management practices undertaken in accordance with the LEMP.

8.9.164 Effects on reptiles are likely to be beneficial and **Significant** at the Site level due to the measures listed above. In EIA terms this would be **Negligible Not Significant.**

European eel and fish

8.9.165 There is potential for beneficial effects on the reens and ditches as a result of the Proposed Development during operation due to the reduction in agricultural practices and depending on the management practices undertaken.

8.9.166 Beneficial effects will occur due to the removal of one side of double hedges to provide more sunlight to the reens.

8.9.167 The ES will consider the potential for electromagnetic field (EMF) effects to occur to eels/ fish, where there is the potential for heating of soil/ water from underground cables.

8.9.168 Effects on European eel and fish have the potential to be beneficial and **Significant** at the Local scale due to the measures listed above, although further assessment to EMF's is required at the ES stage. In EIA terms this would be **Minor Not Significant.**

Badger

8.9.169 Operational impacts are limited to potential fragmentation of habitats due to fence installation. There will be 12.5m and 7m buffers around the main reens and ditches respectively, outside of the fencing which will allow some movement for larger mammals around the Site.

8.9.170 The habitat creation and enhancements will likely increase the amount of foraging habitat for badgers, including the extent of grassland beneath the PV Arrays (a more favourable habitat for foraging than arable land).

8.9.171 Effects on badger are likely to be adverse but **Not Significant** at any geographic

scale. In EIA terms this would be **Negligible Not Significant.**

Hedgehog

8.9.172 Operational impacts are limited to potential fragmentation of habitats due to fence installation. There will be 12.5m and 7m buffers around the main reens and ditches respectively, outside of the fencing which will allow some movement around the site.

8.9.173 Effects on hedgehog are likely to be adverse and **Not Significant** at any geographic scale. In EIA terms this would be **Negligible Not Significant.**

Brown hare

8.9.174 Brown hare are likely to recolonise the application area during the operation phase, however depending on the type of fencing required, this may be limited to reen/ ditch buffers. Brown hare favour open farmland, and favour a mosaic of fields and hedgerows, therefore this have the potential for an overall loss of habitat availability due to fragmentation.

8.9.175 Effects on brown hare are likely to be adverse and **Significant** at the Local scale. In EIA terms this would be **Minor Not Significant.**

8.10 Additional Mitigation and Enhancement Measures

Otter, Badger, Hedgehog, Brown Hare

8.10.1 Suitable gaps (indicatively 30 x 30cm) will be incorporated into all lengths of security fencing to allow mammals to pass beneath.

8.11 Step-Wise Approach

8.11.1 **Table 8-13** below demonstrates how the Step-Wise Approach has been followed for each important ecological receptor, as described in Section 8.5.

Table 8-13 - Step-wise Approach to Effects on IEFs

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
Severn Estuary Ramsar/ SAC/ SSSI	The Severn Estuary SAC/ Ramsar/ SSSI is outside the footprint of the Proposed Development and would therefore be avoided entirely.	Indirect effects such as potential run-off, siltation and dust which could enter the estuary via reens will be minimised through the provision of watercourse buffers and mitigation measures such as method statements/ CEMP. These will remain vegetated to slow/ capture run-off.	The Proposed Development will inherently contribute to the restoration of water quality within the estuary through the reduction in agricultural land uses e.g. fertilisers/ pesticides, siltation and run-off.	No compensation is required.	The Proposed Development will inherently contribute to the restoration of water quality within the estuary through the reduction in agricultural land uses e.g. fertilisers/ pesticides, which cause nutrient imbalance. Cessation of ploughing arable fields and reversion to grassland will also reduce siltation and run off entering the reen/ ditch network which could reduce suspended particles entering the estuary and enhance water quality.
River Usk SAC	The River Usk SAC would be avoided entirely.	Effects such as potential run-off, siltation and dust will be minimised through the	The Proposed Development will contribute to the restoration of water quality within	No compensation is required.	Whilst the proposal will not enhance the River Usk SAC directly, it has potential to restore

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
		provision of watercourse buffers and mitigation measures such as method statements/ detailed CEMP. These will remain vegetated to slow/ capture run-off. Lighting will be controlled via the detailed CEMP. A pre-works check for otter would be undertaken. Each crossing will be individually reviewed/surveyed during the detailed design to confirm the crossing methodology employed Fragmentation of terrestrial habitat for otter during operation will be reduced by providing suitable	functionally linked land (reens) for otter through the reduction in agricultural land uses e.g. fertilisers/ pesticides and run-off. Water quality will be improved through the opening up of ditches by removing one side of east-west double hedgerows, as well as de-siltation and reprofiling of banks to be undertaken in accordance with a LEMP.		habitat within functionally linked land for the notified feature otter. Water quality and quantity will be improved through the opening up of ditches by removing one side of east-west double hedgerows, as well as de-siltation and reprofiling of banks to be undertaken in accordance with a LEMP. This could increase prey for otter and improve commuting conditions by reducing siltation.

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
		gaps at the base of fencing.			
Gwent Levels (covering Magor and Undy SSSI, Redwick and Llandevenny SSSI, Whitson SSSI and Nash and Goldcliff SSSI)	The most sensitive habitat areas are around the reen and the ditch habitats of the site and these underpin the reason for which the SSSI(s) has been designated. Special features (Reen and ditch habitat, insects and other invertebrates and shrill carder bee) in these areas will be avoided through the provision of buffers to reens / ditches. These will be 7m from the top of bank from ditches and smaller reens and 12.5m from the top of bank of designated main rivers (main reens). The panels would be installed on steel frame pile	Potentially damaging effects such as run-off, siltation and dust during construction will be minimised through the provision of watercourse buffers and mitigation measures such as method statements / detailed CEMP. These will remain vegetated to slow/ capture run-off. Disturbance to invertebrates would also be minimised through the operation of an efficient construction programme where landscaping works to the double hedgerows would be prioritised so that	Where temporary effects occur to terrestrial habitat such as bank tops/ marginal vegetation during cable installation, habitats will be reinstated following works. Any temporary impacts to other habitats occurring during the construction/ decommissioning phase would be fully restored following completion. As the development would entail a change in the poaching regime and the removal of cattle, mechanical intervention would be undertaken to regrade the profile	Small sections of notified features reen/ ditches and habitat for insects including shrill carder bee will be permanently impacted by crossing points. The southern side of some double hedgerows would also be removed (to open up the reens/ ditches to increased sunlight and to improve their condition). These impacts would be compensated for on the site through the planting of scrub and through the creation of the bee highway, comprising an appropriate mix of grassland to specifically suit the	A new ‘bee highway will restore diverse habitat for shrill carder bee and other terrestrial species, increase the extent of available habitat and connect existing populations. The highway would improve habitat connectivity across the southern side of the site boundary and would provide a huge overall increase in suitable habitat alongside one of the ‘main river’ reens marking the boundary of the site. All buffer zones adjacent to reens and to ditches would also be

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
	foundations, occupying a negligible ground take across the site. This design option avoids loss of foraging habitat for invertebrates which may occur within the field areas. No open cut construction methods are proposed as these are known to be the most impactful form of construction. Instead, cable bridges and HDD crossings would be used. Certain fields are also set aside for ecological mitigation where no development is proposed, including Field 160 where shrill carder bee have been	the benefits of such measures can begin to take effect as quickly as possible. The retained reen/ ditch habitat and the buffers would remain well connected as there would be no fragmentation to the reen network and its quality would be ensured throughout the lifetime of the scheme, with active management secured through the proposed LEMP.	of the reen/ ditch banks to mitigate the impact by creating a topography and micro habitat which is more suitable for the growth of flora on the reen bank, providing foraging opportunities for shrill carder bee and other invertebrates. The Proposed Development will contribute to the restoration of water quality within the reens/ditches through the reduction in agricultural land uses e.g. fertilisers/ pesticides, siltation and run-off. Reens/ ditches will be restored through selective hedgerow removal, de-siltation and bank reprofiling.	shrill carder bee. In any case, measures to remove hedgerow and improve the reen habitat would in fact represent an enhancement over baseline conditions.	enhanced and planted up with a seed mix to suit the Shrill Carder Bee. This represents a vast enhancement over baseline conditions and would allow greater habitat connectivity across the site area and to the wider Gwent Levels SSSI(s). The LEMP would secure the proposed enhancement measures, and would include monitoring and contingency measures to ensure the effectiveness across the lifetime of the scheme.

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
	recorded, and instead, a range of enhancement measures are proposed through land management.		Low intensity grazing will enhance areas for shrill carder bee. Mechanical means to create poached areas will be undertaken where monitoring shows it is necessary. Creation and long-term management of a 'bee highway' over a length of 5.5km.		
Magor Marsh SSSI	This offsite statutory designated site would be avoided entirely.	This site is located upstream of the Proposed Development. In any case inherent design measures which includes 7m and 12.5m buffers around ditches and main reens respectively, would reduce/ prevent siltation or accidental spillage within any connected watercourses	None required.	None required.	It is unlikely that the scheme can enhance this SSSI given that it is located 0.8km upstream.

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
Newport Wetlands SSSI/ NNR	This offsite statutory designated site would be avoided entirely.	This site is located upstream of the Proposed Development. In any case inherent design measures which includes 7m and 12.5m buffers around ditches and main reens respectively, would reduce/ prevent siltation or accidental spillage within any connected watercourses	None required.	None required.	It is unlikely that the scheme can enhance this SSSI given that it is located 1.1km away.
Non-statutory designated sites	The offsite non-statutory designated sites would be avoided entirely.	Potentially damaging effects such as run-off, siltation and dust during construction will be minimised through the provision of watercourse buffers and mitigation measures such as method statements / detailed CEMP. These will remain	The Proposed Development will contribute to the restoration of water quality within any linked watercourses through the reduction in agricultural land uses e.g. fertilisers/ pesticides and run-off.	No compensation is required.	Water quality will be enhanced through the opening up of ditches by removing one side of east-west double hedgerows, as well as de-siltation and reprofiling of banks to be undertaken in accordance with a LEMP. This could enhance the water quality of ditches within offsite non-

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
		vegetated to slow/ capture run-off.			statutory sites and increase aquatic flora and fauna.
Coastal Floodplain Grazing Marsh	It is not possible to completely avoid coastal and floodplain grazing marsh, however within panelled fields the impacts are limited to piled footings new access tracks and widening of existing tracks, with the remaining grassland being retained beneath the panels. Reens/ ditch buffers will be avoided as much as possible, except at crossing points. These will be 7m from the top of bank from ditches and smaller reens and 12.5m from the top of bank of designated main rivers (main reens). No open cut	More sensitive habitats, such as marshy grassland, will have cables routed underground, or sensitive working practices to be detailed in method statements/ detailed CEMP. Where trenching is required, soil layers will be separated and replaced in the correct order so that the habitat can regenerate naturally. Method statements will be provided as part of the detailed CEMP. Potentially damaging effects to watercourses, such as run-off, siltation and dust during construction will be	Where temporary effects occur, habitats will be restored following works. 55ha of arable land will be restored to grassland. The Proposed Development will contribute to the restoration of high-quality grasslands through the reduction in agricultural land uses e.g. ploughing, fertilisers/ pesticide use, soil compaction and run-off. A LEMP will be implemented to reduce the grazing pressure on all fields within the Proposed Scheme (including those with panels).	Compensation for permanent losses include the reversion of c. 55ha arable to higher diversity grassland and the enhancement of mitigation fields.	The grassland will continue to be in low intensity agricultural use and specific sections will be managed through low density grazing or mowing with the aim of increasing structural and plant diversity across the application area. A seven-year reen management programme, along with enhancements to reduce the double hedges on ditches and reens in order to open them up to more light will further enhance Coastal and Floodplain Grazing Marsh.

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
	construction methods are proposed as these are known to be the most impactful form of construction. Instead, cable bridges and HDD crossings would be used. Approximately 51.5ha will be retained without PV arrays and avoided other than ongoing management.	minimised through the provision of watercourse buffers and mitigation measures such as method statements / detailed CEMP. These will remain vegetated to slow/ capture run-off.	51.5ha of mitigation land will be enhanced for a range of species and will increase the quality of CFGM onsite through ongoing management.		The LEMP would secure the proposed enhancement measures, and would include monitoring and contingency measures to ensure the effectiveness across the lifetime of the scheme.
Wet reens/ ditches	Reens/ ditches will be avoided as much as possible through the provision of permanent buffers. These will be 7m from the top of bank from ditches and smaller reens and 12.5m from the top of bank of designated main rivers (main reens). No open cut construction	Potentially damaging effects such as run-off, siltation and dust during construction will be minimised through the provision of watercourse buffers and mitigation measures such as method statements / detailed CEMP. These will remain	Where temporary effects occur to terrestrial habitat such as bank tops/ marginal vegetation during cable installation, habitats will be reinstated following works. The Proposed Development will contribute to the restoration of water quality within reens/	No direct compensation for ditch/ reen loss is required, however enhancement of selected reens/ ditches through hedgerow removal (southern hedge of double hedgerow), desilting and reprofiling will compensate for any losses of marginal/ aquatic vegetation	Reens/ ditches will be restored through selective hedgerow removal. By removing the southern side of east-west double hedgerows, an increase in sunlight will reach the water, increasing water quality and floral diversity. In addition, less siltation will occur

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
	methods are proposed as these are known to be the most impactful form of construction. Instead, cable bridges and HDD crossings would be used.	vegetated to slow/ capture run-off. The retained reen/ ditch habitat and the buffers would remain well connected as there would be no fragmentation to the reen network and its quality would be ensured throughout the lifetime of the scheme, with active management secured through the proposed LEMP.	ditches through the reduction in agricultural land uses e.g. fertilisers/ pesticides and run-off. The reversion of 55ha of arable to grassland will contribute to the restoration of adjacent reens/ ditches through the cessation of ploughing and therefore reduction in suspended particles entering the water.	at bridge/ culvert locations.	as a result of leaf litter. A seven-year reen management programme will be implemented as part of the LEMP, including de-siltation and bank reprofiling. This will allow a more diverse aquatic flora and greater water quantity. Existing open reen and ditches and single hedged ditches will be maintained as such, through an annual management programme or as appropriate. All buffer zones adjacent to reens and to ditches would also be enhanced and planted up with a meadow seed mix

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
					and managed sensitively to create a resilient network of biologically rich habitat, that link to each other within the wider area. The LEMP would secure the proposed enhancement measures, and would include monitoring and contingency measures to ensure the effectiveness across the lifetime of the scheme.
Hedgerows	Hedgerows are avoided where possible, however they cannot be avoided entirely due to the requirement for cable/ vehicle crossings between fields. Hedgerows are not always considered	Hedgerow loss will be minimised by reducing the number of crossings required and utilising existing farm gates/ crossings where possible.	Retained hedgerows will be restored where appropriate through planting up of gaps and a LEMP to secure sensitive management.	Hedgerow planting may be undertaken in suitable locations.	Retained hedgerows will be enhanced by planting up gaps (where they will not cause shading to reens/ ditches) and an ongoing management plan will be implemented

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
	desirable from a conservation perspective in this landscape and multiple NRW management plans for the area recommend hedge removal.	Inherent buffers will reduce the chance of accidental damage to retained hedges. The detailed CEMP will ensure protection during the construction/ decommissioning phases.			to create dense, bushy hedgerows.
Roosting bats	Removal of trees with bat roost potential will be avoided. Nocturnal working will be avoided (although there may be some requirement for compound lighting). 7 – 12.5m buffers to main reens/ ditches means that accidental damage to trees by machinery during construction/	Measures to avoid or reduce the risk of accidental encroachment and light-spill will be set out in the detailed CEMP.	None required.	None required.	New bat boxes will be provided as an enhancement to increase the availability of roost sites for bats within the site. Boxes will be located on suitable trees on an existing network of connected commuting habitat.

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
	decommissioning is unlikely to occur.				
Commuting/ foraging bats	Bat commuting/ foraging routes will be avoided where possible, with 12.5 or 7m buffers created either side of watercourses where the majority of hedgerows are also located. Nocturnal working will be avoided (although there may be some requirement for compound lighting).	Measures to avoid or reduce the risk of accidental encroachment and light-spill will be set out in the detailed CEMP. Hedgerow loss will be minimised by reducing the number of crossings required and utilising existing farm gates/ crossings where possible to reduce fragmentation effects. Inherent buffers will reduce the chance of accidental damage to retained hedgerows from vehicles, plant and personnel during all phases of the development.	The Proposed Development will include a number of habitat creation measures, managed via the LEMP, which will deliver a range of benefits for bats, including the provision of higher quality, connected habitat, for example the buffers to the retained hedgerows, reens and ditches, areas of scrub and rough grassland. Reversion of arable to grassland will create additional foraging habitat. Retained hedgerows will be restored where appropriate through planting up of gaps and a LEMP to	Scrub planting will be undertaken near the southern boundary, compensating for the loss of hedgerow and creating a linear, connected flyway for bats. This will connect to retained hedgerows to ensure connectivity between commuting routes can be maintained. Hedgerow planting may be undertaken in suitable locations.	Retained hedgerows will be enhanced where appropriate through planting up of gaps and a LEMP to secure sensitive management to create higher quality, resilient networks, that link across the site. New areas of scrub will be planted to enhance the foraging opportunities within the site. Grassland buffers to reens/ ditches will be managed for invertebrates thereby improving invertebrate prey for bats.

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
		The panels will be angled at a fixed slope of between 15 to 25 degrees from horizontal and spaced (3m between rows) to prevent collision.	secure sensitive management to create higher quality, resilient networks.		
Amphibians	The offsite pond that supports great crested newts will be avoided. Terrestrial habitat of higher value within the Site will also be avoided where possible (hedgerows and margins of reens/ ditches), with the exception of small breaks for cable crossings.	12.5m and 7m buffers to main reens and ditches will minimise impacts to the majority of suitable terrestrial habitat used for commuting and shelter. Measures to avoid light-spill will be set out in the detailed CEMP. Hedgerow loss will be minimised by reducing the number of crossings required, and utilising existing farm gates/ crossings where possible.	Retained hedgerows will be restored where appropriate through planting up of gaps. Reen/ ditch buffers within 250m of the pond will be managed to create rough grassland linking to retained mitigation land. Where possible, new pond/s will be created as a further enhancement. A LEMP will be secured to ensure sensitive management and create higher	**Compensate** – Hedgerow planting may be undertaken in suitable locations.	The Proposed Development will include a number of habitat creation measures, managed via the LEMP, which will deliver a range of benefits for amphibians, including the provision of higher quality, connected habitat, for example the 7m and 12.5m buffers to the retained hedgerows, reens and ditches, new pond/s, hibernacula/ habitat piles and connectivity to the bird mitigation fields

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
		A method statement (as part of an EPS mitigation licence) will be followed to protect GCN during works.	quality, resilient networks than currently exists. The cessation of agricultural practices is further likely to increase the volume of invertebrate prey for great crested newts.		via the reen/ ditch buffers which will provide higher value habitat than the arable and modified grassland which would have been present prior to the Proposed Development.
Dormice	Hedgerows are avoided where possible, however cannot be avoided entirely due to the requirement for cable/ vehicle crossings between fields.	Hedgerow loss during the construction phase will be minimised by reducing the number of crossings required and utilising existing farm gates/ crossings where possible. Inherent 12.5m and 7m buffers will reduce the chance of accidental damage to retained hedgerows. A detailed CEMP and method	Retained hedgerows will be restored where appropriate through planting up of gaps to enhance connectivity, and a LEMP to secure sensitive management.	Habitat creation (scrub and/or hedgerow) will ensure a minimum 1:1 ratio compensation, with long-term management under a LEMP. This will create larger, resilient and diverse areas of habitats that connect on site populations and connect the existing hedgerow network with offsite habitats.	Scrub planted close to known records will be planted with a mixture of shrubs that provide a diverse range of foraging material for dormouse and extends the season of available food. It will be planted in extensive blocks and managed to support dormouse which will enhance the current provision of low-value hedgerows. Furthermore, the linear area of scrub planted near the

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
		statement will be followed in accordance with an EPS mitigation licence detailing methods and timing of works to minimise adverse effects on dormice including lighting. Where one side of double hedgerows will be removed to enhance the ditch network, the north side will be retained to ensure that connectivity for dormouse is maintained.			southern boundary of the site will enhance connectivity. This increase in available habitat has the potential to increase the population of dormouse on site.
Otter	The reen/ditches will be avoided as much as possible through the provision of permanent buffers. These will be 7m from the top of bank from ditches and smaller reens and 12.5m from the top	Potentially damaging effects such as run-off, siltation and dust during construction will be minimised through the provision of watercourse buffers and mitigation measures such as	The Proposed Development will contribute to the restoration of water quality within reens/ ditches through the reduction in agricultural land uses e.g. fertilisers/ pesticides and run-off.	None required.	Water quality and quantity will be improved through the opening up of ditches by removing one side of east-west double hedgerows, as well as de-siltation and reprofiling of banks to be undertaken in

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
	of bank of designated main rivers (main reens). Pre-works checks will be undertaken for otter holts/ shelters and crossing points micro-sited to avoid adverse effects.	method statements / detailed CEMP. These will remain vegetated to slow/ capture run-off. Measures to avoid or reduce the risk of accidental watercourse encroachment and light-spill will be set out in the detailed CEMP. Any open trenches will be either covered at night or a means of escape such as a plank will be placed inside. This will be stipulated within the detailed CEMP. The culvert design will be agreed prior to works to ensure they are suitable for otter.	The LEMP will include a seven-year reen management programme including de-siltation and bank reprofiling, along with enhancements to reduce the double hedges on ditches and reens.		accordance with a LEMP. This could increase prey for otter and improve commuting conditions by reducing siltation.

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
		Fence gaps will be provided to prevent fragmentation.			
Water vole	The reen/ditches will be avoided as much as possible through the provision of permanent buffers. These will be 7m from the top of bank from ditches and smaller reens and 12.5m from the top of bank of designated main rivers (main reens). Crossing points currently do not impact known water vole burrows, however a pre-works check will be undertaken for water vole burrows and crossing points micro-sited to avoid adverse effects.	Potentially damaging effects such as run-off, siltation and dust during construction will be minimised through the provision of watercourse buffers and mitigation measures such as method statements / detailed CEMP. These will remain vegetated to slow/ capture run-off. Measures to avoid or reduce the risk of accidental watercourse encroachment and light-spill will be set out in the detailed CEMP.	The Proposed Development will contribute to the restoration of water quality within reens/ ditches through the reduction in agricultural land uses e.g. fertilisers/ pesticides and run-off.	None required.	Water quality and quantity will be improved through the opening up of ditches by removing one side of east-west double hedgerows, as well as de-siltation and reprofiling of banks to be undertaken in accordance with a LEMP. This could increase foraging habitat for water vole through increasing marginal vegetation and improve commuting conditions by reducing siltation.
Aquatic invertebrates	The reen/ditches will be avoided as much as possible	Potentially damaging effects such as run-off,	Where temporary effects occur to bank tops during	None proposed.	Water quality and quantity will be improved through

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
	through the provision of permanent buffers. These will be 7m from the top of bank from ditches and smaller reens and 12.5m from the top of bank of designated main rivers (main reens).	siltation and dust during construction will be minimised through the provision of watercourse buffers and mitigation measures such as method statements / detailed CEMP. These will remain vegetated to slow/ capture run-off. Disturbance to aquatic invertebrates would be minimised through the operation of an efficient construction programme where landscaping works would be prioritised so that the benefits of such measures can begin to take effect as quickly as possible.	cable installation, habitats will be reinstated following works. The Proposed Development will contribute to the restoration of water quality within reens/ ditches through the reduction in agricultural land uses e.g. fertilisers/ pesticides and run-off. The removal of one side of double hedgerows will enhance water quality and plant diversity to increase opportunities for aquatic invertebrates. The LEMP will include a seven-year reen management programme including de-siltation and bank reprofiling,		the opening up of ditches by removing one side of east-west double hedgerows, as well as de-siltation and reprofiling of banks to be undertaken in accordance with a LEMP. This will increase flora and water quality needed by aquatic invertebrates to complete their life cycles. A new 'bee highway' will restore diverse habitat alongside one of the 'main river' reens marking the boundary of the site, providing a mosaic of habitats and protecting the reen from run-off, further enhancing the habitat aquatic invertebrates.

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
		The retained habitat would remain well connected as there would be no fragmentation to the reen network or buffers, and its quality would be ensured throughout the lifetime of the scheme through the proposed LEMP. The LEMP will ensure habitat management is timed to avoid key breeding periods.	along with enhancements to reduce the double hedges on ditches and reens. As the development would entail a change in the poaching regime and the removal of cattle, mechanical intervention would be undertaken to regrade the profile of the reen banks to mitigate the impact by creating a topography and micro- habitat which is more suitable for the creation of structural diversity, bare ground and floral diversity.		All buffer zones adjacent to other reens and to ditches would also be enhanced and planted up with a seed mix to suit invertebrates. This represents a vast enhancement over baseline conditions and would allow greater habitat connectivity across the site area and to the wider Gwent Levels SSSI(s). The LEMP would secure the proposed enhancement measures, and would include monitoring and contingency measures to ensure the effectiveness across the lifetime of the scheme.
Terrestrial invertebrates	Key habitat for terrestrial invertebrates (including the shrill	Disturbance to terrestrial invertebrates would be minimised	Where temporary effects occur to terrestrial habitat such as bank tops/	Small sections of reen/ ditches margins (including habitat for shrill	A new 'bee highway will restore diverse habitat for shrill carder bee and

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
	carder bee) is located within reen/ ditch margins; these areas will be avoided through the provision of buffers to reens / ditches. These will be 7m from the top of bank from reens and 12.5m from the top of bank of designated main rivers. The panels would be installed on steel frame pile foundations, occupying a negligible ground take across the site. This design option avoids loss of foraging habitat for terrestrial invertebrates which may occur within the field areas. Certain fields are also avoided and	through the operation of an efficient construction programme where landscaping works would be prioritised so that the benefits of such measures can begin to take effect as quickly as possible. The retained habitat would remain well connected as there would be no fragmentation to the reen network or buffers, and its quality would be ensured throughout the lifetime of the scheme through the proposed LEMP. The LEMP will ensure habitat management is timed to avoid key breeding periods.	marginal vegetation during cable installation, habitats will be reinstated following works. Any temporary impacts occurring during the construction phase would be fully restored following completion. As the development would entail a change in the poaching regime and the removal of cattle, mechanical intervention would be undertaken to regrade the profile of the reen banks to mitigate the impact by creating a topography and micro- habitat which is more suitable for the creation of structural diversity,	carder bee) will be permanently impacted by crossing points. The southern side of some double hedgerows would also be removed (to open up the reens to increased sunlight and to improve their condition). These impacts would be compensated for on the site through the planting of scrub and through the creation of the bee highway, comprising an appropriate mix of grassland to specifically suit terrestrial invertebrates and particularly the shrill carder bee. In any case, measures to remove hedgerow and improve the reen habitat would	other terrestrial species, increase the extent of available habitat and connect existing populations. The highway would improve habitat connectivity across the southern side of the site boundary and would provide a huge overall increase in suitable habitat alongside one of the 'main river' reens marking the boundary of the site. All buffer zones adjacent to reens and to ditches would also be enhanced and planted up with a seed mix to suit the shrill carder bee. This represents a vast enhancement over baseline conditions and

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
	set aside for ecological mitigation where no development is proposed and instead, a range of enhancement measures are proposed through land management.	The detailed CEMP would minimise loss of habitat through careful selection of crossing points.	bare ground and floral diversity.	in fact represent an enhancement over baseline conditions.	would allow greater habitat connectivity across the site area and to the wider Gwent Levels SSSI(s). The LEMP would secure the proposed enhancement measures, and would include monitoring and contingency measures to ensure the effectiveness across the lifetime of the scheme.
Reptiles	The majority of higher value habitat such as watercourses, hedgerows and field margins will be avoided as much as possible through the provision of permanent buffers to reens/ ditches.	Measures to avoid or limit the risk of killing and injury of reptiles will be set out in the detailed CEMP. The LEMP will be implemented to ensure habitat management is timed to avoid harm to reptiles (where grassland cutting is required).	The Proposed Development is considered to provide enhanced habitat for reptiles through the provision of buffers, lower input land uses and sensitive long-term management	None required.	Log piles/ hibernacula will be added to buffer zones to provide shelter for reptiles. Areas of rough grassland will be created within selected buffers to provide enhanced foraging and shelter.

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
European eel and fish	The reen/ditches will be avoided as much as possible through the provision of permanent buffers. These will be 7m from the top of bank from ditches and smaller reens and 12.5m from the top of bank of designated main rivers (main reens). During operation, reens and ditches would be avoided, other than routine management.	Potentially damaging effects such as run-off, siltation and dust during construction will be minimised through the provision of watercourse buffers and mitigation measures such as method statements / detailed CEMP. These will remain vegetated to slow/ capture run-off.	The Proposed Development will contribute to the restoration of water quality within reens/ ditches through the reduction in agricultural land uses e.g. fertilisers/ pesticides and run-off. Reens/ ditches will be restored through selective hedgerow removal (see enhancement column).	None required.	Reens/ ditches will be restored through selective hedgerow removal. By removing the southern side of east-west double hedgerows, an increase in sunlight will reach the water, increasing water quality and floral diversity. In addition, less siltation will occur as a result of leaf litter, improving water quality for European eel and fish. A seven-year reen management programme will be implemented as part of the LEMP, including de-siltation and bank reprofiling. This will allow a more

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
					diverse aquatic flora and greater water quantity, allowing European eel and fish to have access to more watercourses. Existing open reen and ditches and single hedged ditches will be maintained as such, through an annual management programme or as appropriate. All buffer zones adjacent to reens and to ditches would also be enhanced and planted up with a meadow seed mix and managed sensitively to create a resilient network of biologically rich habitat, that link to each other within the wider area, supporting a higher

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
					water quality within the watercourse by protecting it from run-off. The LEMP would secure the proposed enhancement measures, and would include monitoring and contingency measures to ensure the effectiveness across the lifetime of the scheme.
Badger	The Proposed Development currently avoids direct impacts on all known badger setts.	If a new sett is found prior to works, it will either be retained with an appropriate buffer or individual setts will be closed under an appropriate licence. Measures to avoid or reduce risks to badger including disturbance from piling/ vibrations to the retained setts	The change of land use to reduce agricultural inputs is likely to restore soils and provide enhanced foraging for badger.	None required.	The change of land use and ongoing sensitive grassland management via the LEMP to reduce agricultural inputs is likely to restore soils and provide enhanced foraging for badger through an increase in soil invertebrates and other prey.

Receptor	Step 1 – Avoid	Step 2 - Minimise	Step 3 – Mitigate/ Restore	Step 4 – Compensate	Step 5 - Enhance
		will be set out in the detailed CEMP. Fence gaps will be provided to prevent fragmentation.			
Hedgehog	The Proposed Development avoids the majority of key habitat for sheltering hedgehog (e.g. within hedgerows).	Measures to avoid or reduce risks to hedgehog will be set out in the detailed CEMP. Fence gaps will be provided to prevent fragmentation.	The change of land use and ongoing sensitive grassland management via the LEMP to reduce agricultural inputs is likely to restore soils and provide enhanced foraging for hedgehog.	None required.	The change of land use and ongoing sensitive grassland management via the LEMP to reduce agricultural inputs is likely to restore soils and provide enhanced foraging for hedgehog through an increase in soil invertebrates and other prey.
Brown hare	It is not possible to avoid all brown hare habitat, however the Proposed Development will be phased so that undisturbed habitat is always available and all grassland below solar panels will be available during operation.	Measures to avoid or reduce risks to brown hare will be set out in the detailed CEMP. Fence gaps will be provided to prevent fragmentation.	The change of land use and ongoing sensitive grassland management via the LEMP to reduce agricultural inputs is likely to restore soils and provide enhanced foraging for brown hare.	None required.	

8.12 Residual Effects and Conclusions

8.12.1 A summary of residual effects indicated by the preliminary assessment presented here are provided in **Table 8-14** and **Table 8-15,** below, for the construction/ decommissioning phases and operational phase, respectively.

Table 8-14 - Summary of Residual Effects (Construction and Decommissioning)

Receptor	Description of Impact	Significance of effect without mitigation	Mitigation/Enhancement measure	Residual effect after mitigation
Severn Estuary Ramsar/ SAC/ SSSI	Water pollution via reen network Crossing points resulting in localised siltation. Dust	Negligible, Not Significant at any geographic scale. with embedded mitigation, subject to Chapter 10 Water Environment recommendations. In EIA terms this would be **Negligible Not Significant.**	Refer to **Chapter 10 Water Environment**	Negligible, Not Significant at any geographic scale. with embedded mitigation, subject to Chapter 10 Water Environment recommendations. In EIA terms this would be **Negligible Not Significant.**
River Usk SAC	Water pollution via reen network Crossing points resulting in localised siltation. Impacts on otter during culvert/ bridge installation	Negligible and Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.	N/A	Negligible and Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.
Gwent Levels (covering Magor and Undy SSSI, Redwick and Llandevenny SSSI, Whitson SSSI and	Siltation Water quality/ quantity impacts Pollution of watercourses Temporary impacts to shrill carder bee habitats	Negligible and Not Significant at any geographic scale., subject to Chapter 10 Water Environment recommendations. In EIA terms this would be **Negligible Not Significant**.	Refer to **Chapter 10 Water Environment**	Negligible and Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.

Nash and Goldcliff SSSI)				
Magor Marsh SSSI	Hydrology/ Water quantity	Negligible, Not Significant at any geographic scale, subject to Chapter 10 Water Environment recommendations. In EIA terms this would be **Negligible Not Significant.**	Refer to **Chapter 10 Water Environment**	Negligible, Not Significant at any geographic scale, subject to Chapter 10 Water Environment recommendations. In EIA terms this would be **Negligible Not Significant.**
Newport Wetlands SSSI/ NNR	Hydrology/ Water quantity	Negligible, Not Significant at any geographic scale, subject to Chapter 10 Water Environment recommendations. In EIA terms this would be Negligible Not Significant.	Refer to **Chapter 10 Water Environment**	Negligible, Not Significant at any geographic scale, subject to Chapter 10 Water Environment recommendations. In EIA terms this would be Negligible Not Significant.
Non-statutory sites	Water pollution Hydrology/ Water quantity	Negligible Not Significant at any geographic scale, subject to Chapter 10 Water Environment recommendations. In EIA terms this would be **Negligible Not Significant**.	Refer to **Chapter 10 Water Environment**	Negligible, Not Significant at any geographic scale, subject to Chapter 10 Water Environment recommendations. In EIA terms this would be **Negligible Not Significant**.
Coastal Floodplain Grazing Marsh	Permanent land take for grid yard/ compound. Land take for footings and access tracks.	Adverse and Significant at the Local scale. In EIA terms this would be **Minor Not Significant.**	N/A	Adverse and Significant at the Local scale. In EIA terms this would be **Minor Not Significant.**

	Rutting/ compaction of fields in wet weather			
Wet reens/ ditches	Siltation Run-off Temporary impacts to channel/ bank	Negligible and are Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant.**	N/A	Negligible and are Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant.**
Hedgerows	Permanent loss of hedgerow at cable/ vehicular crossings	Adverse, Significant at Local scale. In EIA terms this would be **Minor Not Significant**.	To be subject to further review at ES stage.	Adverse, Significant at Local scale. In EIA terms this would be **Minor Not Significant**.
Roosting bats	Lighting	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant.**	N/A	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant.**
Commuting/ foraging bats	Lighting Hedgerow loss (fragmentation)	Adverse at the Site level and are Not Significant. In EIA terms this would be **Negligible Not Significant.**	N/A	Adverse at the Site level and are Not Significant. In EIA terms this would be **Negligible Not Significant.**
Amphibians	Hedgerow removal at cable crossings causing injury/ mortality Entrapment in excavations	Negligible and Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant.**	N/A	Negligible and Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant.**
Dormice	Hedgerow removal at cable crossings causing injury/ mortality and loss of nest sites.	Negligible and Not Significant above the site level. In EIA terms this would be **Negligible Not Significant.**	N/A	Negligible and Not Significant . above the site level. In EIA terms this would be **Negligible Not Significant.**

Otter	Avoidance behaviour/ disturbance Entrapment in excavations Lighting	Adverse, Significant at the National scale. In EIA terms this would be **Major Significant**.	N/A	Adverse, Significant (disturbance only) at the National scale. In EIA terms this would be **Major Significant**.
Water vole	Impacts to burrows	Adverse, Significant at the Local scale. In EIA terms this would be **Minor Not Significant**.	N/A	Adverse, Significant at Local scale. In EIA terms this would be **Minor Not Significant**.
Aquatic invertebrates	Pollution/ siltation at crossing points	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.	N/A	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.
Terrestrial invertebrates	Short-term reversible impacts during installation of cable crossings.	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.	N/A	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.
Reptiles	Small scale habitat loss at cable crossings	Adverse, Significant at the Site level. In EIA terms this would be **Negligible Not Significant**.	N/A	Adverse, Significant at the Site level. In EIA terms this would be **Negligible Not Significant**.
European eel and fish	Pollution/ siltation at crossing points	Adverse, Not Significant. In EIA terms this would be **Negligible Not Significant.**	N/A	Adverse, Not Significant. In EIA terms this would be **Negligible Not Significant**.
Badger	Disturbance Entrapment in excavations	Adverse, Significant at the Site level. In EIA terms this would be **Negligible Not Significant.**	N/A	Adverse, Significant at the Site level. In EIA terms this would be **Negligible Not Significant**.
Hedgehog	Entrapment in excavations	Negligible, Not Significant at any geographic scale. In EIA terms	N/A	Negligible, Not Significant at any geographic scale. In EIA

		this would be **Negligible Not Significant**.		terms this would be **Negligible Not Significant.**
Brown hare	Temporary displacement Entrapment in excavations	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.	N/A	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.

Table 8-15 - Summary of Residual Effects (Operation)

Receptor	Description of Impact	Significance of effect without mitigation	Mitigation/Enhancement measure	Residual effect after mitigation
Severn Estuary Ramsar/ SAC/ SSSI	Beneficial effects from change in management Run-off/ hydrology	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.	N/A	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.
River Usk SAC	Beneficial effects from change in management Fragmentation of otter habitat due to fencing	Beneficial, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant.**	N/A	Beneficial, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.
Gwent Levels (covering Magor and Undy SSSI, Redwick and Llandevenny SSSI, Whitson SSSI and Nash and Goldcliff SSSI)	Run-off/ hydrology Beneficia effects from change in management	Beneficial, Significant effects at the National scale. In EIA terms this would be **Major Significant.**	N/A	Beneficial, Significant effects at the National scale. In EIA terms this would be **Major Significant**.

Magor Marsh SSSI	None	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**	N/A	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**
Newport Wetlands SSSI/ NNR	None	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**	N/A	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**
Coastal Floodplain Grazing Marsh	Beneficial effects from change in management Overall increase in habitat through reversion of arable to grassland	Beneficial, Significant at Local scale. In EIA terms this would be **Minor Not Significant**.	N/A	Beneficial, Significant at Local scale. In EIA terms this would be **Minor Not Significant**.
Wet reens/ ditches	Run-off/ hydrology Beneficial effects from change in management	Beneficial, Significant effects at National scale. In EIA terms this would be **Major Significant**.	N/A	Beneficial, Significant effects at National scale. In EIA terms this would be **Major Significant.**
Hedgerows	Overall loss due to proposals to open up selected reens	Significant adverse effect at Local scale. In EIA terms this would be **Minor Not Significant**.	Whilst hedgerows will be managed positively under the LEMP, there will be an overall loss in hedgerow length across the Proposed Development.	Significant adverse effect at Local scale. In EIA terms this would be **Minor Not Significant**.
Commuting/ foraging bats	Reduction in foraging habitat (hedgerows) Collision	Beneficial, Significant at Site level. In EIA terms this would be **Negligible Not Significant**	N/A	Beneficial, Significant at Site level. In EIA terms this would be **Negligible Not Significant**

	Higher quality foraging habitat (grassland providing higher invertebrate prey)			
Amphibians	Beneficial or adverse effects from change in management	Beneficial, Significant at Local scale. In EIA terms this would be **Minor Not Significant**.	N/A	Beneficial, Significant at Local scale. In EIA terms this would be **Minor Not Significant**
Otter	Beneficial effects from change in management Fragmentation of otter habitat due to fencing	Beneficial, Significant at Local scale. In EIA terms this would be **Minor Not Significant**.	Suitable gaps (indicatively 30 x 30cm) will be incorporated into all lengths of security fencing to allow mammals to pass beneath.	Beneficial, Significant at Local scale. In EIA terms this would be **Minor Not Significant**.
Aquatic invertebrates	Egg laying on panels Loss of cattle poached margins Beneficial or adverse effects from change in management	Adverse, Significant at the Local scale. In EIA terms this would be **Minor Not Significant**.	N/A	Adverse, Significant at the Local scale. In EIA terms this would be **Minor Not Significant**.
Terrestrial invertebrates	Shading of grassland Beneficial or adverse effects from change in management	Beneficial, Significant at Local scale. In EIA terms this would be **Minor Not Significant**.	N/A	Beneficial, Significant at Local scale. In EIA terms this would be **Minor Not Significant**.
Reptiles	Beneficial or adverse effects from change in management	Beneficial, Significant at Site level. In EIA terms this would be **Negligible Not Significant.**	N/A	Beneficial, Significant at Site level. In EIA terms this would be **Negligible Not Significant**.

European eel and fish	Beneficial effects from change in land management EMFs	Potential for Beneficial, Significant at Local level. In EIA terms this would be **Minor Not Significant**.	Further information regarding EMFs to be provided at ES stage.	Potential for Beneficial, Significant at Local level. In EIA terms this would be **Minor Not Significant**.
Badger	Beneficial effects from change in management Fragmentation due to fencing	Adverse, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.	Suitable gaps (indicatively 30 x 30cm) will be incorporated into all lengths of security fencing to allow mammals to pass beneath.	Negligible, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**.
Hedgehog	Fragmentation due to fencing Higher quality foraging habitat	Adverse, Not Significant at any geographic scale. In EIA terms this would be **Negligible Not Significant**	Suitable gaps (indicatively 30 x 30cm) will be incorporated into all lengths of security fencing to allow mammals to pass beneath.	Negligible, Not Significant at any geographic scale. In EIA terms this would be Negligible **Not Significant**.
Brown hare	Fragmentation due to fencing Higher quality foraging habitat	Adverse, Significant at Local level. In EIA terms this would be **Minor Not Significant**	Suitable gaps (indicatively 30 x 30cm) will be incorporated into all lengths of security fencing to allow mammals to pass beneath.	Negligible, Not Significant at Local level. In EIA terms this would be **Negligible Not Significant**.

8.13 Cumulative Effects

8.13.1 A preliminary assessment has been undertaken which examines the result from the combined effects of the Proposed Development with other developments on each Important Ecological Feature.

8.13.2 A short list of developments that may interact with effects on ecological features of the Proposed Development is presented in **Chapter 5 (EIA Methodology)**. This equates to c. 200 approved (within the past five years) and pending planning applications across the councils of Newport, Monmouthshire, Torfaen, Bristol City Council and North Somerset Council.

8.13.3 Only developments in the short list that fall within the Proposed Developments ZoI, as defined in **Section 8.3.13** have the potential to result in cumulative effects with the Proposed Development. All developments falling outside the ZoI are excluded from this assessment. To further refine the list, the development description and location was reviewed and sites excluded where the development type was unlikely to have impacts, for example development sites away from watercourses/ the estuary that comprised householder developments, domestic (small-scale) solar, developments within urban areas, change of use and refurbishment/ conversion of existing buildings.

8.13.4 In relation to pollution effects, it is assumed that the other developments will be designed and constructed in accordance with best practice guidance and that a detailed CEMP would be followed during the construction phase, such that the risk of cumulative pollution incidents will be low and there should not be potential for a significant cumulative effect.

8.13.5 On the basis of the above, the developments listed in **Table 8-16**, from the original short list, are scoped into the assessment, and will be addressed for cumulative effects within the ES Chapter.

8.13.6 These sites are considered to have cumulative effects relating to habitat loss for the duration of the Proposed Development (i.e. permanent loss of coastal and floodplain grazing marsh). The exact area of habitat loss is not quantified in these schemes,

but it is considered that the cumulative effect of the reduction in CFGM could be Significant, at least at the Local scale.

Table 8-16 – Developments to be Considered for Cumulative Effects

Project	Planning Reference	Address	Status	Evidence from Planning Portal e.g. NRW/ Ecology officer comments
Installation of a 230 MW battery energy storage system (BESS).	22/0823	Uskmouth Power Station West Nash Road Nash Newport South Wales NP18 2BZ	Approved - 07/12/2022	The Ecology Officers identifies that habitat loss "would be a permanent impact of high magnitude on a feature of local ecological value, and that the effect would have significance in the context of at least the site and immediate surrounds".
Reserved matters application for Phase 5E(1) relating to layout, scale, access, appearance and landscaping pursuant to outline planning permission 06/0471 for a mixed use urban extension and details to partially discharge conditions 1 (reserved matters), 5 (infrastructure phasing plan), 6 (formal and informal recreation areas), 8 (materials), 9 (hard landscaping materials), 10 (boundary treatments), 11 (management strategy for maintenance of open space), 12 (off street parking and cycle storage), 15 (emergency access), 16 (highways details), 17 (green travel strategy), 18 (highways surface water disposal details), 19 (noise assessment), 22 (street lighting), 24 (site levels), 33	24/0301	Llanwern Works Queensway Llanwern Newport South Wales NP19 4QZ	Awaiting Decision	Summary of ES chapter: Habitats and plants on the site are typical of mixed agriculture: improved and semi-improved pasture, arable fields, species-rich and species-poor hedgerows, scrub and small areas of woodland. Hedgerow loss would be compensated for. Overall, the scheme is considered in the ES to result in a minor negative impact on habitats within the application-site.

(surface water drainage), 34 (drainage), 39 (carbon reduction strategy/sustainability assessment) and 43 (access to open water for firefighting purposes).				
DNS				
The installation of a solar park with an approximate design capacity of 75MW. Development includes ancillary electrical equipment and infrastructure, access tracks, security fencing and CCTV.	DNS/3220457 - Rush Wall Solar Park Ltd	Land near the village of Redwick, south east of Newport, Wales on the Caldicot Levels	Examination	Minor, adverse, temporary, short-term effects not considered significant were envisaged upon areas of coastal floodplain grazing marsh (HPI) as a result of the scheme during operation. All other effects were deemed either negligible or positive.
Renewable Energy & Green Hydrogen Production Facility including ground-mounted solar PV, wind turbine, hydrogen electrolysers, hydrogen and energy storage and ancillary and associated infrastructure and cabling.	DNS CAS-01960-J2H3X5 - Magor Net Zero	Land at Magor, Monmouthsire	Notification Stage	Only scoping report available. Likely to lie within CFGM but no information available yet.

8.14 Further Survey Work

8.14.1 Further work that will be undertaken to support the ecology assessment and presented within the ES is set out below.

- Update dormouse survey
- Update bat activity (seasonal) and automated detector surveys (monthly) covering April – October
- Aerial tree assessments based on the cable crossing locations.
- Further otter and water vole surveys based on the cable crossing locations.
- Update terrestrial invertebrate, bumblebee and aquatic invertebrate surveys.

8.15 Summary

8.15.1 A preliminary assessment of the likely effects arising from construction, operation and decommissioning of the Proposed Development on important ecological receptors has been undertaken.

8.15.2 The Proposed Development includes a range of embedded mitigation measures designed to reduce environmental effects on these receptors including inherent buffers, avoidance of key fields, and a detailed CEMP and LEMP to manage adverse effects. As a result there will be minor adverse effects on a limited number of receptors: hedgerows, coastal and floodplain grazing marsh and potentially otter and water vole during construction, should they move into an area of works prior to construction. The majority of adverse effects are considered to occur during the construction phase with several beneficial effects predicted during operation through the management of the Site, including a reduction in agricultural inputs, desilting of watercourses and sensitive management of grasslands and buffers, bringing in benefits to the reen/ ditch network and SSSI, and a wide range of fauna including invertebrates.

8.15.3 Further work to be completed and included in the ES includes:

- Continued consultation with stakeholders to discuss the Proposed Development and proposed mitigation;
- Further ecological surveys as detailed above;

- An assessment on electromagnetic fields (EMFs)
- Further refinement of the oLEMP and oCEMP to reduce ecological impacts.
- Further assessment of hydrological effects on offsite designated site receptors (e.g. water quantity).
- Further refinement of the crossing schedule to reduce impacts of hedgerows and the species which rely upon them.

8.16 References

Ref 8-1 Council Directive 92/43/EEC (1992) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01992L0043-20130701 [Accessed November 2025].

Ref 8-2 The Conservation of Habitats and Species Regulations (2017) Available at https://www.legislation.gov.uk/uksi/2017/1012/contents [Accessed November 2025].

Ref 8-3 Wildlife and Countryside Act (1981) Available at https://www.legislation.gov.uk/ukpga/1981/69 [Accessed November 2025].

Ref 8-4 The Protection of Badgers Act (1992). Available at https://www.legislation.gov.uk/ukpga/1992/51/contents [Accessed November 2025].

Ref 8-5 Environment (Wales) Act (2016). Available at: https://www.legislation.gov.uk/anaw/2016/3/contents [Accessed November 2025].

Ref 8-6 Llywodraeth Cymru Welsh Government (2021) *Future Wales: The national plan 2040*, *GOV.WALES*. Available at: https://www.gov.wales/future-wales-national-plan-2040-0 [Accessed November 2025].

Ref 8-7 Llywodraeth Cymru Welsh Government (2024) *Planning Policy Wales*, *GOV.WALES*. Available at: https://www.gov.wales/planning-policy-wales [Accessed November 2025].

Ref 8-8 Llywodraeth Cymru Welsh Government (2025) Technical Advice Note 5 (Nature, Conservation and Planning), GOV.WALES. Available at https://www.gov.wales/technical-advice-note-tan-5-nature-conservation-and-planning [Accessed November 2025].

Ref 8-9 Monmouthshire County Council (2025) Monmouth Adopted Local Development Plan (2011-2021) Adopted February 2014. Available at https://www.monmouthshire.gov.uk/planning-policy/monmouthshire-local-development-plan/ [Accessed November 2025].

Ref 8-10 Newport City Council (2025) Newport Local Development Plan (2011-2026) Adopted Plan, January 2015. Available at https://www.newport.gov.uk/planning/planning-policy/local-development-plan/local-development-plan-adoption [Accessed November 2025].

Ref 8-11 Department for Energy Security and Net Zero (2024) *Overarching national policy statement for energy (EN-1)*, *GOV.UK*. Available at:

https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1 [Accessed November 2025].

Ref 8-12 Department for Energy Security and Net Zero (2024a) *National policy statement for Renewable Energy Infrastructure (EN-3)*, *GOV.UK*. Available at: https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3 [Accessed November 2025].

Ref 8-13 Department for Energy Security and Net Zero (2023) National policy statement for Electricity Networks Infrastructure (EN-5), GOV.UK. Available at: https://www.gov.uk/government/publications/national-policy-statement-for-electricity-networks-infrastructure-en-5 [Accessed November 2025].

Ref 8-14 Environment Act 2021. Available at https://www.legislation.gov.uk/ukpga/2021/30/contents [Accessed November 2025].

Ref 8-15 CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, version 1.3*. Chartered Institute of Ecology and Environmental Management, Winchester.

Ref 8-16 The Greater Gwent Nature Recovery Action Plan (undated). Available at https://www.blaenau-gwent.gov.uk/media/xdndjdto/greater-gwent-nature-recovery-action-plan.pdf [Accessed November 2025].

Ref 8-17 Newport City Council's Local BAP (undated) https://www.newport.gov.uk/environment/biodiversity [Accessed November 2025].

Ref 8-18 Monmouthshire County Council (2024) Biodiversity and Ecosystem Resilience Forward Plan. Available at: https://democracy.monmouthshire.gov.uk/documents/s38174/Appendix%201%20Biodiversity%20Ecosystems%20Resilience%20S6%20Forward%20plan%202024.pdf [Accessed November 2025].

Ref 8-19 BSI (2013) *BS42020:2013 Biodiversity. Code of practice for planning and development.* British Standards Institution, London, UK.

Ref 8-20 BRE (2014) *Biodiversity Guidance for Solar Developments*. Eds G E Parker and L Greene.

Ref 8-21 Forest of Dean District Council (2021) Wye Valley and Forest of Dean Bat SAC: Development Management – Horseshoe Bat activity survey and assessment guidance Available at: https://www.fdean.gov.uk/media/q1jnfo54/wv-fod-bat-sac-development-management-survey-and-assessment-guidance-vr-july-2021.pdf

Ref 8-22 JNCC (2010) *Handbook for Phase 1 Habitat Survey - a Technique for Environmental Audit.* JNCC, Peterborough, ISBN 0 86139 636 7.

Ref 8-23 Natural England (2010) *Higher Level Stewardship – Farm Environment Plan (FEP) Manual*. Third Edition.

Ref 8-24 Rodwell, J.S. (ed.) (1995) *British Plant Communities. Volume 4: Aquatic communities, swamps and tall-herb fens.* Cambridge University Press.

Ref 8-25 Rodwell, J.S. (ed.) (2006) *National Vegetation Classification: Users' Handbook.* JNCC.

Ref 8-26 Collins, J. (ed.) (2016) *Bat Survey for Professional Ecologists: Good Practice Guidelines (3rd edition).* The Bat Conservation Trust, London.

Ref 8-27 Collins, J. (ed.) (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition).* The Bat Conservation Trust, London.

Ref 8-28 Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000) *Evaluating the Suitability of Habitat for the Great Crested Newt (Triturus Cristatus).* Herpetological Journal, 10: 143-155.

Ref 8-29 Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014a) *Analytical and methodological development for improved surveillance of the Great Crested Newt*. Defra Project WC1067. Freshwater Habitats Trust: Oxford.

Ref 8-30 Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014b) *Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA.* Freshwater Habitats Trust, Oxford.

Ref 8-31 English Nature (2001) *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough.

Ref 8-32 Bright P.W., Morris P.A. and Mitchell-Jones A. (2006) *Dormouse Conservation Handbook, 2nd Edition*. English Nature, Peterborough.

Ref 8-33 National Rivers Authority (2001) *The New Rivers and Wildlife Handbook.* RSPB, NRA, RSNC.

Ref 8-34 Highways Agency (1999) Nature Conservation Advice in Relation to Otters. Design Manual for Roads and Bridges Volume 10.

Ref 8-35 Dean M., Strachan R., Gow D. and Andrews R (2016) T*he Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series).* Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

Ref 8-36 Palmer M., Drake C.M. & Stewart N. (2013). A manual for the survey and evaluation of the aquatic plant and invertebrate assemblages of grazing marsh ditch systems, Version 6. Buglife, Peterborough.

Ref 8-37 Drake C.M., Lott D.A., Alexander K.N.A. and Webb J. (2007) *Surveying terrestrial and freshwater invertebrates for conservation evaluation.* Natural England Research Report NERR005. Natural England, Peterborough.

Ref 8-38 JNCC (2008) Coastal and Floodplain Grazing Marsh. Available at: https://data.jncc.gov.uk/data/82b0af67-d19a-4a89-b987-9dba73be1272/UKBAP-BAPHabitats-07-CoastFloodGrazingMarsh.pdf [Accessed November 2025].

Ref 8-39 Rodgers, K (2023) Comparison of the reen surveys 2011-2013 and 2023 for submerged plants at Gwent Levels – Whitson SSSI. Natural Resources Wales.

Ref 8-40 SE WALES AREA STATEMENT GWENT LEVELS LANDSCAPE PROFILE (2019) Available at https://www.gwentwildlife.org/sites/default/files/2022-03/Gwent%20Levels%20Landscape%20Profile.pdf [Accessed November 2025].

Ref 8-41 BCT (2020) Core Sustenance Zones and habitats of importance for designing Biodiversity Net Gain for bats. Bat Conservation Trust, London.

Ref 8-42 Natural England (2015) Site Improvement Plan: Severn Estuary Mor Hafren (SIP213) Available at: https://publications.naturalengland.org.uk/publication/4590676519944192 [Accessed November 2025].

Ref 8-43 Pinaud, D., Claireau, F., Leuchtmann, M. and Kerbiriou C. (2018) *Modelling landscape connectivity for greater horseshoe bat using an empirical quantification of resistance.* Journal of Applied Ecology. 2018: 55:2600–2611.

Ref 8-44 Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001), *Great Crested Newt Conservation Handbook*, Froglife, Halesworth.

Ref 8-45 Wells D., Chanin P. and Gubert L. (2025) *Hazel Dormouse Mitigation Handbook*. The Mammal Society. ISBN: 978-1-0687982-2-1.

Ref 8-46 Tinsley, E.; Froideveaux, J.S.P; ZsebőK, S.; Szabadi, K.L.; and Jones, G. (2023). *Renewable energies and biodiversity: Impact of ground- mounted solar photovoltaic sites on bat activity.* Journal of Applied Ecology 60, 1752–1762

Ref 8-47 Greif, S. & Siemers B. M. *Innate recognition of water bodies in echolocating bats. Nat. Commun.* 1:107 doi: 10.1038/ncomms1110 (2010).

Ref 8-48 Russo D, Cistrone L, Jones G (2012) *Sensory Ecology of Water Detection by Bats: A Field Experiment.* PLoS ONE 7(10): e48144. doi:10.1371/ journal.pone.0048144

Ref 8-49 Harrison C., Lloyd H. and Field C. (2017) *Evidence review of the impact of solar farms on birds, bats and general ecology.* Natural England Technical report. [online] DOI:10.13140/RG.2.2.24726.963.

Ref 8-50 Taylor, R., Conway J., Gabb O. and Gillespie J. (2019) *Potential ecological impacts of ground-mounted photovoltaic solar panels*. [online] https://www.bsg-ecology.com/wp-content/uploads/2019/04/Solar-Panels-and-Wildlife-Review-2019.pdf [Accessed November 2025].

Ref 8-51 Horvath G.,Blaho M., Egri A., Kriska I.S. & Robertson B. (2010), *Reducing the maladaptive attractiveness of solar panels to polarotactic insects,* Conservation Biology 24: 1644-1653.

Ref 8-52 Ewers R.M. & Didham R.K. (2006) *Confounding factors in the detection of species responses to habitat fragmentation*, Biological Reviews of the Cambridge Philosophical Society 81: 117-142.

Ref 8-53 Guiller C., Affre L., Deschamps-Cottin M., Geslin B. & Kaldonski N. (2017) *Impacts of solar energy on butterfly communities in Mediterranean agro-ecosystems*, Sustainable Energy 36(6):1817-1823.

Ref 8-54 Parker G. & McQueen C. (2013) *Can solar farms deliver significant benefits for biodiversity?* Preliminary Study July-August 2013 – In Harrison C. Lloyd H. & Field C. (2017), Evidence review of the impact of solar farms on birds, bats and general ecology, Natural England, Peterborough.