Ecological Impact Assessment

Frome Valley Solar Farm

Anesco Limited

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1	7 June 2024	Aaron Bailey	Julia Kozlowska	Gary Oliver
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Basis of Report

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Acronyms and Abbreviations

AW	Ancient Woodland
BNG	Biodiversity Net Gain
CIEEM	Chartered Institute of Ecology and Environmental Management
DBW	Daytime Bat Walkover
EcIA	Ecological Impact Assessment
EMP	Ecological Management Plan
EPS	European Protected Species
ERIC	Environmental Records Information Centre
GCN	Great Crested Newt
GLTA	Ground Level Tree Assessment
HAP	Habitat Action Plan
LBAP	Local Biodiversity Action Plans
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographic Information for the Countryside
MoRPh	Modular River Physical Survey
PEA	Preliminary Ecological Appraisal
PRA	Preliminary Roost Assessment
PRF	Potential Roost Feature
RCA	River Condition Assessment
SLCI	Site of Local Conservation Interest
SLR	SLR Consulting Limited
SSSI	Sites of Special Scientific Interest

1.0 Introduction

SLR Consulting Limited (SLR) was commissioned by Anesco Limited to undertake an Ecological Impact Assessment (EcIA) of a site south of the River Frome, Herefordshire, HR1 4HG (central OS grid reference SO 59459 41588) (hereafter referred to as the "Site").

1.1 Site Description

The Site at the baseline is 29.90 ha and is comprised of a series of agricultural fields, used as non-cereal arable and pasture for cattle grazing. The Site is dissected by a series of ditches, hedgerows, and a tributary to the River Frome. The Site's habitats are illustrated in in Drawing 1.

The wider landscape is predominantly agricultural land. A railway line runs immediately northeast of the Site. The village of Shucknall lies c.1 km northwest of the Site, and the A438 road lies c.535 m to the south. The closest city is Hereford, c.5.58 km to the west.

1.2 Details of the Proposed Development and Summary of Biodiversity Enhancements

The proposed development (Appendix A) comprises the construction of:

- Solar arrays, inverters and transformers, a 66kV substation and DNO control room, and associated cabling, supporting a total installed capacity of 20.60 MWp;
- Surfaced access tracks; and
- Security fencing.

Access would be achieved through an existing farm access point within a hedgerow, which would be widened slightly and a section reduced to a height of 60cm to create a visibility splay.

Habitats within the Site would be enhanced significantly compared to the arable and pasture baseline (refer to Appendix B: Landscape Strategy Plan, and Section 4: Assessment of Effects within this report for further details). Proposed enhancements include a total of 6.38 ha of 'other neutral grassland' creation, and creation of 4.6 ha of grazed 'modified grassland'. Grasslands will be split into two management areas with different seed mixes to benefit a range of species. In addition to grassland creation, enhancements include the planting of 0.8241 ha of mixed scrub; 0.158 km of native, species rich hedgerow planting; and the planting of 37 native trees.

Access for wildlife would be retained throughout the solar farm through the installation of regular open mammal gates/ access gaps. Species specific enhancements would also be provided including installation of bird boxes, bat boxes and barn owl boxes.

1.3 Purpose of this Report

The purpose of this report is to:

- Describe the baseline data collection and assessment methodologies used;
- Summarise the baseline ecological conditions and identify any important receptors (if present);
- Set out the mitigation and compensation measures required to ensure compliance with nature conservation legislation and to address any potentially significant ecological effects (if relevant);
- Describe proposed enhancement measures; and
- Provide an assessment of the significance of any residual effects in relation to the effects on biodiversity and the legal and policy implications.

1.4 Evidence of Technical Competence and Experience

The fieldwork and report were completed by SLR Project Ecologist, Mr Aaron Bailey MSc, BSc (Hons). Aaron has three years of experience working in ecological consultancy, has held a Level 3 field botany FISC (Field Identification Skills Certificate) since 2022, is a qualifying member of CIEEM (Chartered Institute of Ecology and Environmental Management), and is experienced in protected species and UK Habitat surveys.

The report has been reviewed by SLR Consulting Associate Ecologist, Ms Julia Kozlowska. Julia is a qualifying member of CIEEM (Chartered Institute of Ecology and Environmental Management) holds a Natural England Survey Class Licence for great crested newts, is a competent botanist and is experienced in the production of Ecological Impact Assessments for solar developments

The report has been approved by SLR Consulting Principal Ecologist, Mr Gary Oliver.. Gary is a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM) and is a Chartered Environmentalist (SocEnv), with over 28 years' relevant experience within ecological consultancy. He is a competent ornithologist and botanist, holds a Class 2 survey licence for great crested newt (also a Registered Consultant under the Low Impact GCN Class Licence), as well as a Class 2 survey licence for bats.

1.5 Relevant Legislation and Policy

Relevant national Legislation and Policy has been provided in Appendix C. Relevant extracts from local Policy have been provided below:

1.5.1 Herefordshire Local Plan

The Herefordshire Draft Local Plan[1] is the Local Plan for Herefordshire.

Relevant polices from the plan are as follows:-

Policy CC1: A carbon neutral Herefordshire

"To achieve a carbon neutral Herefordshire, appropriate mitigation for the environmental and climatic impacts of development should be embedded within all development proposals from the outset. Developments should be located and designed in such a way that they are resilient to the impacts of climate change over their lifetime. Measures taken will vary depending on the location, such as whether in relation to an urban setting in Hereford or the market towns or in the county's rural areas.

Development proposals will seek to contribute by:

Mitigating climate change

1. Demonstrating operational carbon neutrality on-site, through a fabric-first approach to its design, low carbon technologies, on-site renewable energy generation and carbon offsetting. Measures should be taken to minimise carbon emissions across the full lifecycle of the development before carbon offsetting is considered;

2. Maximising opportunities to secure significant reductions in carbon emissions for residential developments, by achieving energy efficiency standards in line with statutory and regulatory requirements. Major non-residential developments should demonstrate how they achieve Building Research Establishment Environmental Assessment Methodology (BREEAM) 'Excellent', or an equivalent or better methodology;

[1] Regulation 18 Local Plan Strategic Policies Document (herefordshire.gov.uk)

3. Maximising opportunities to generate energy from renewable sources on-site, such as from wind and solar. Neighbourhood Development Plans are strongly encouraged to support the provision of new community-owned energy schemes;

4. Maximising opportunities to source and/or generate energy from renewable sources off-site. Where evidence demonstrates that this is feasible, strategic sites should be connected to a District Heat Network. Where feasibility is not demonstrated, new homes should be built with the necessary infrastructure in place to enable such connections to be easily integrated in the future. In particular, opportunities should be sought to connect commercial development, producing sufficient levels of waste heat, with residential development where they are located within close proximity. District Heat Networks should be planned from the outset. Large-scale renewable energy schemes and diversification of renewable energy schemes with other uses will be supported where landscape and environmental impacts are considered acceptable;

5. Designing to provide an improved choice of transport modes. This can be facilitated by making it as safe and easy as possible to walk, wheel and cycle to essential facilities and services, and by locating within walking distance of public transport nodes. Active travel should be facilitated through design, such as the creation and enhancement of walking and cycling links in accordance with the principles of well-connected neighbourhoods. These should be integrated with new and existing green and blue corridors, wherever possible. Extensive measures to encourage active travel and micromobility within Hereford will be supported alongside any new road or other transport infrastructure, to reduce traffic in the centre of the city. Similar measures will also be supported in the market towns;

6. Delivering high quality, interconnected and multifunctional green and blue infrastructure, which will be designed to provide 'carbon sinks', sequester carbon and improve air quality. Green and blue infrastructure should be seen as an integral part of development and planned from the outset. To improve air quality, tree planting and other carbon sequestering habitat types should be prioritised alongside busy roads;

7. Ensuring that electric vehicle (EV) charging points are installed in every new home with off-street parking, and outside commercial developments, village halls, community facilities and services. This should be supplementary to active travel and public transport infrastructure;

8. Supporting the transition to a circular economy by minimising waste, maximising the reuse of materials, and prioritising low embodied carbon materials. Where possible, developments should use local resources and locally sourced materials;

9. Ensuring that commercial development is located close to active travel routes which link to residential development. Such development should provide secure bicycle parking and showering facilities for employees;

10. Minimising detrimental impact on the county's soils, recognising their importance in sequestering and storing carbon;

11. Supporting proposals for battery energy storage systems, where they are appropriately located and designed in accordance with relevant policies of the Plan. Such developments should minimise and mitigate any potential risks arising to the environment and public safety;

Adapting to climate change

12. Being designed to be resilient and adaptive to the future impacts of climate change to ensure people's safety, taking into account the known physical and environmental constraints, over their lifetime. Buildings must be able to withstand the impact of extreme conditions, such as from flooding and heat exposure. Schemes should minimise the risk of overheating, now and in future, through the careful design, the placement and orientation of

buildings. Appropriate low energy ventilation measures should also be incorporated to maximise people's comfort in a changing climate;

13. Being located in accordance with the Sequential Test and the Exceptions Test (where appropriate) and have regard to the Strategic Flood Risk

Assessment. Areas at risk of flooding, both now and in future, should be avoided and development should contribute to reducing flood risk on site without exacerbating flood risk elsewhere;

14. Incorporating natural flood management features, such as Sustainable urban Drainage Systems (SuDS), into its design to reduce surface water runoff. SuDS should be designed to provide amenity value through natural habitats for wildlife which should be considered at the earliest stage of development; and

15. Incorporate water efficiency, water recycling, and rainwater harvesting measures to mitigate the impact of drought and reduce resource and associated energy consumption. To minimise adverse impacts on water quantity and quality, new residential developments must achieve water efficiency targets of: a minimum of 110 litres per person per day in areas outside the Rivers Wye and Clun Special Areas of Conservation (SACs) and 100 litres per person per day within these SACs. Non-residential development is expected to achieve a minimum of 3 credits under the measure "Wat01" of the BREEAM New Construction Standard."

Policy EE1: Protecting and enhancing the quality of the natural environment

"All development proposals should provide and consider their effect upon the following aspects:

1. Recognise and facilitate the positive impacts the natural environment has with respect to climate change mitigation and the declared ecological emergency;

2. Protect, conserve and enhance statutory and locally designated landscape, ecological and geological sites;

3. Protect and conserve priority habitats and protected species;

4. Protect, conserve and enhance landscape features, habitats and ecological connectivity, extending Herefordshire's natural capital, green and blue infrastructure, and nature recovery networks;

5. Protect and enhance key natural assets of agricultural soils, water, wetlands, woodlands, river meadows, or any scheme that could impact habitat diversity;

6. Improve water quality and restore and enhance riparian habitats;

7. Demonstrate that they will not result in an adverse impact on the integrity of any National Site Network Site (Special Area of Conservation, Special Protection Areas or Ramsar) through additional nutrient and pollution pathways. In parts of the River Wye SAC which are failing to meet their conservation targets, developments must demonstrate at least nutrient neutrality. Proposals should show how pollution will be prevented or mitigated. In other parts of the SAC which are not failing to meet their conservation targets, developments must demonstrate how best available technology has been applied, in line with Council guidance, to reduce nutrient, sediment and pollution outputs as far as feasible and how those measures are sufficient to ensure that National Site Network Sites will be protected from harm, in accordance with the Habitat Regulations Assessment process; 32

8. Achieve a minimum of 20% biodiversity net gain on strategic sites allocated in the Local and Neighbourhood Development Plans. All other residential development sites are expected to achieve a minimum of 10% biodiversity net gain. Commercial development sites of at least 1,000 square metres, or which are more than 1 hectare in size, are also required to achieve a minimum of 10% biodiversity net gain;

9. Have special regard for the Malvern Hills and Wye Valley National Landscapes in the county valuing their distinctive ecology, character, tranquillity, and landscape character;

10. Utilise green space to help mitigate and reverse the effects of climate change and biodiversity loss through habitat creation and management, increase tree establishment, water management schemes and other appropriate measures;

11. Identify, protect and strengthen the local treescape and hedgerow network;

12. Contribute to help increase canopy cover in urban and rural settlements;

13. Promote, maintain and increase the intrinsically dark landscapes and dark skies of the county. Schemes should avoid superfluous outdoor lighting to help reduce light pollution and protect dark skies and the night-time environment;

14. Avoid and minimise air, water and noise pollution and manage effects on habitats and species improving air, water and noise quality to ensure wildlife and natural habitats thrive;

15. Encourage and support the long term management of all features in the natural environment; and

16. Ensure better access to nature, nature-rich areas and the green environment."

2.0 Methodology

2.1 Scope

The scope of this EcIA, i.e. the collection of baseline data, evaluation of ecological receptors, and assessment of impacts, follows guidelines set out by the Chartered Institute of Ecology and Environmental Management (CIEEM)[2] and references therein. Ecological features considered within the impact assessment include designated sites, habitats, protected species and relevant species of principal importance for nature conservation.

2.2 Baseline Data Collection

2.2.1 Desk Study

The Herefordshire Biological Records Centre (HBRC), the ecological database for Herefordshire, was commissioned to undertake a search of statutory and non-statutory designated sites for nature conservation and protected/ notable species for the Site, to obtain data up to 2 km from the Site boundary. This data was obtained on the 11th of April 2024 (Appendix D Desk Study Data).

Information on statutory designated sites for nature conservation and geological interest and granted European Protected Species Licences (EPSLs) for the Site and 5 km radius (15 km for internationally designated sites), was also obtained from the MAGIC website managed by Natural England[3].

[2] CIEEM (2022). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.2. Chartered Institute of Ecology and Environmental Management, Winchester.

[3] Natural England. (2023). Multi-Agency Geographic Information for the Countryside. www.magic.defra.gov.uk

2.2.2 Field Surveys

2.2.2.1 UKHab Habitat Survey and Condition Assessments

The Site was surveyed to identify the broad habitat types present in accordance with the UK Habitat Survey (UKHab V.2) methodology[4]. Habitats were classified to Level 5 of the Primary Hierarchy where possible, and all mandatory Secondary codes were used, along with optional Secondary codes where relevant.

The UK Habitat Classification (UKHab) system comprises a principal hierarchy (the Primary Habitats) which involves the identification of broad habitats and Priority habitats, as well as the use of non-hierarchical Secondary Codes.

The survey was carried out between 8th and 9th April 2024 on overcast days with intermittent light rain,wind between a light breeze and fresh breeze, and ambient temperatures of 7-14°C.

The habitat survey was extended to include an assessment of the potential of the Site to support legally protected or notable species, and a search for field signs of such species, including the following:

- A search for badger (*Meles meles*) setts and field signs within the Site and 30 m radius (where accessible);
- An assessment of trees to ascertain their potential for roosting bats, as described further in Section 2.2.2.3;
- An assessment of the Site's potential to support breeding birds, reptiles, great crested newt (*Triturus cristatus*), water vole (*Arvicola amphibius*) and otter (*Lutra lutra*); and
- An assessment of whether the Site supports, or has potential to support, priority species or habitats, particularly those which are rare in the UK or Herefordshire.

Plant species listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), such as Japanese knotweed (*Fallopia japonica)*, Himalayan balsam (*Impatiens glandulifera)* and giant hogweed (*Heracleum mantegazzianum)* were searched for.

A Habitat Condition Assessment was also carried out in conjunction with the UKHab survey, using standardised habitat condition assessment criteria contained within the Statutory Biodiversity Metric[5].

Any incidental evidence or sightings of protected or notable species were recorded.

2.2.2.2 MoRPh and River Condition Assessments

A Modular River Physical field survey (MoRPh) and River Type desk study were undertaken of watercourses located within the Site and within 10 m of the Site boundary, namely the River Frome and an unnamed tributary of the River Frome.

[4] https://ukhab.org

[5] Defra (2023) Statutory biodiversity metric tools and guides. Available at: https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides

The survey was carried out in accordance with MoRPh survey guidelines[6, 7] and comprised of a series of MoRPh5 subreach surveys, such that a minimum of 20% of each watercourse within 10 m of the Site was surveyed.

The Preliminary Condition Score for each MoRPh5 subreach is calculated as the sum of the average of the positive condition indicator scores and the average of the negative condition indicator scores for the subreach. The Preliminary Condition Score is combined with information from the River Type desk study and translated into a Final Condition Score (Good, Fairly Good, Moderate, Fairly Poor or Poor). The Final Condition Score can be downgraded by one category if the river is found to be 'overdeep'.

The survey was carried out between 10th and 11th April 2024 on overcast days with occasional light rain,wind between light air and gentle breeze, and ambient temperatures of 10-17°C.

Data collected from these surveys was used to complete a River Condition Assessment (RCA) of the watercourses.

2.2.2.3 Ground Level Tree Assessment (GLTA) for bats

Trees within the Site were subject to Ground Level Tree Assessments (GLTA), to search for PRFs (such as hollows, cracks, woodpecker holes, and partially detached bark) and evidence of bats such as bat droppings. A systematic inspection was conducted from multiple angles around the base of the trees concerned. The assessed trees were then given a grading which is based on criteria set within best practice guidelines (Table 2-1 and Table 2-2).

Table 2-1: Categories of tree suitability for roosting bats, taken from BCT Bat Survey Guidelines 2023.

Suitability of Trees for Roosting Bats	Description of Category
NONE	Either no PRFs in tree, or highly unlikely to be any
FAR	Further assessment required to establish if PRFs are present in the tree
PRF	A tree with at least one PRF present (see Table 2.3 for PRF categories)

Table 2-2: Categories of suitability of a tree's PRFs for roosting bats, taken from BCT Bat Survey Guidelines 2023.

Suitability of Tree PRFs for Roosting Bats	Description of Category
PRF-I	Only suitable for individual bats of very small numbers of bats, either due to size or lack of suitable surrounding habitats
PRF-M	Suitable for multiple bats and may therefore be used by a maternity colony.

[6] Modular River Survey (2022). The MoRPh Survey: Technical Reference Manual, 2022 version.

[7] Gurnell, A.M., England, J., Scott, S.J., Shuker, L.J. (2022). A Guide to Assessing River Condition: Part of the Rivers and Streams Component of the Biodiversity Net Gain Metric.

2.2.2.4 Great Crested Newt Habitat Suitability Index (HSI) Assessment of Ponds

Ponds within 250 m of the Survey Area were identified by reference to OS maps and freely available aerial photographs and the locations investigated during the field survey. Through this, three ponds were identified. The locations of which are:

- Pond 1 – grid reference SO 59693 41973;
- Pond 2 – grid reference SO 59654 41488; and
- Pond 3 – grid reference SO 59650 41410.

These ponds were subject to Habitat Suitability Index (HSI) assessments, on 11th April 2024, to gauge their potential to support great crested newt, using the standard methodology[8].

Great crested newt HSI scores are calculated using ten parameters: site location; pond area; frequency of pond drying; water quality; shade; waterfowl; fish; presence of other ponds in the area; terrestrial habitat; and macrophyte communities. Each parameter scores a value of between 0.01 and 1. These scores are then multiplied and 'rooted' to produce a geometric mean score, of between 0 and 1. The following categorical scale is then used to estimate the overall suitability of the water body concerned:

HSI score	Pond suitability for GCN
<0.5	Poor
0.5-0.59	Below average
0.6-0.69	Average
0.7-0.79	Good
>0.8	Excellent

2.2.2.5 eDNA Surveys

The ponds were sampled for eDNA analysis on 11th April 2024. In accordance with the approved protocol, twenty samples were collected from the margins of the ponds using sterile equipment. The water at each sampling area was gently stirred using a sterile ladle before samples were taken, to mix up DNA (if present) which tends to sink, whilst ensuring that sediment on the bottom of the pond was not disturbed, as this is where historical DNA can persist.

The samples were then fixed in an ethanol preserving solution, and sent to ADAS laboratory for analysis, using the Natural England approved method contained within Biggs *et al*. (2014)[9]. According to Biggs *et al*. (2014), great crested newt DNA can be detected within the pond water for up to 21 days after a great crested newt (including efts) has left the water; a 99.3% detection rate is achieved when 80-90% of the waterbody margin is sampled.

To avoid possible contamination, the surveyor avoided entering the water. Latex gloves were worn when sampling and only sterile equipment came into contact with the water.

2.2.3 Biodiversity Net Gain Assessment

The results of the UKHab survey, RCA surveys and habitat condition assessments were analysed within the Statutory Biodiversity Metric[5] to calculate the biodiversity value of the Site at baseline, and predicted value post-construction.

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

[9] Biggs, J et al. (2014). *Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA*. Freshwater Habitats Trust, Oxford.

The Biodiversity Metric uses habitat as a proxy for biodiversity and its primary application is to provide planners and developments with a method of establishing how much and what type of habitats should be created or enhanced in order to ensure that the impacts of a developments result in a net gain of biodiversity. Habitats are assigned the following 'multiplier scores' which affect their value:

- Distinctiveness: A measure of the type, importance and relative rarity of a habitat;
- Condition: A measure of the present, or predicted, condition of a habitat type; and
- Strategic significance: How a habitat/area is regarded within Local Planning Policy.

2.2.4 Limitations

2.2.4.1 Desk Study

Desk study data is unlikely to be exhaustive, especially in respect of species, and is intended mainly to set a context for the study. It is therefore possible that protected species not identified during the data search do in fact occur within the vicinity of the Site. Interpretation of maps and aerial photography has been conducted in good faith, using recent imagery, but it has not been possible to verify the accuracy of any statements relating to land use and habitat context outside of the field study area.

2.2.4.2 Field Surveys

Surveys were undertaken at a suitable time of year in suitable conditions.

The MoRPh field surveys were undertaken at suitable low flow conditions. Limitations encountered within this survey were typical of MoRPh surveys of narrow channels and oriented around dense vegetation obscuring visibility of the channel bed and face. Consequently, a precautionary approach was taken when surveying areas of poor visibility. Furthermore, a representative spread of MoRPh5 locations across the Site was surveyed such that this was not deemed to be a significant limitation.

An ecological study provides only a "snapshot" of the conditions prevailing at the time of survey. Lack of evidence of a particular species does not necessarily preclude them from being present on Site at a later date. Whilst it is considered unlikely that any significant evidence of activity by protected or notable species has been overlooked, due to the nature of the subjects of ecological surveys it is feasible that species that use the Site may not have been recorded by virtue of their seasonality, habit or random chance. It is considered unlikely however, that additional surveys of the Site at this time would materially alter the conclusions of this report.

2.3 Assessment Approach

Ecological features can be important for a variety of reasons and the rationale used to identify them is explained in the text. Importance may relate, for example, to the quality or extent of the Site or habitats therein; habitat and/ or species rarity; the extent to which such habitats and/ or species are threatened throughout their range, or to their rate of decline.

2.3.1.1 Determining Importance

In accordance with the CIEEM guidelines only ecological receptors (habitats, species, ecosystems and their functions/ processes), which are considered to be important and potentially affected by the project should be subject to detailed assessment. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable, although these can be included in the assessment in order to demonstrate ecological enhancements, for example.

Ecological features are considered within a defined geographical context. For this project the following geographic frame of reference is used:

- International;
- National (i.e. UK);
- Regional (i.e. West Midlands);
- County (i.e. Herefordshire); and
- Local (i.e. 2 km).

For designated sites, importance should reflect the geographical context of the designation. For example, a Site of Special Scientific Interest would normally be considered nationally important.

In accordance with CIEEM guidelines the value of habitats has been measured against published selection criteria where available. Examples of relevant criteria include Annex 1 of the Habitats Directive, descriptions of priority habitats[10], e.g. those included in Section 41 of NERC Act 2006, Local Wildlife Site Criteria, and Habitat Action Plans (HAPs) contained within the Local Biodiversity Action Plan.

In assigning a level of value to a species, it is necessary to consider its distribution and status. Reference has therefore been made to published lists and criteria where available. Examples of relevant lists and criteria include: species of European conservation importance (as listed on Annexes II, IV and V of the Habitats Directive), and UK priority species, e.g. Section 41 species and Birds of Conservation Concern[11].

For the purposes of this assessment ecological features of Local importance or greater and/ or subject to legal protection have been subject to detailed assessment. Effects on other ecological features are considered unlikely to be significant in legal or policy terms.

2.3.2 Impact Assessment

The impact assessment process involves the following steps:

1 Identifying and characterising impacts;
2 Incorporating measures to avoid and mitigate (reduce) these impacts;
3 Assessing the significance of any residual effects after mitigation;
4 Identifying appropriate compensation measures to offset significant residual effects (if required); and
5 Identifying opportunities for ecological enhancement.

Both direct and indirect impacts are considered. Direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ecological impacts are attributable to an action which affects ecological resources through effects on an intermediary ecosystem, process or feature, e.g. the creation of roads which cause hydrological changes, which, in the absence of mitigation, could lead to the drying out of marshy grassland.

For the purposes of this assessment, in accordance with CIEEM guidelines, a ‘significant effect’ is an effect that either supports or undermines biodiversity conservation objectives for ‘important ecological features or receptors’.

[10] i.e. Priority habitats and species as listed in the UK and devolved administrations, as listed: http://jncc.defra.gov.uk/page-5705

[11] Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. & Win, I. (2021) Birds of Conservation Concern 5: the population status of birds in the UK, Channel Islands and Isle of Man. British Birds, 114.

2.3.3 Significant Effects

The concept of ecological significance is addressed in paragraphs 5.24 through to 5.28 of CIEEM guidelines. Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of EcIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from International to Local and the scale of significance of an effect may or may not be the same as the geographic context in which the feature is considered important.

2.3.4 Avoidance, Mitigation, Compensation and Enhancement

Where potentially significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the CIEEM Guidelines. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures have been applied residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement.

It is important for the EcIA to clearly differentiate between avoidance mitigation, compensation and enhancement and these terms are defined here as follows:

- Avoidance is used where an impact has been avoided, e.g. through changes in scheme design;
- Mitigation is used to refer to measures to reduce or remedy a specific negative impact in situ;
- Compensation describes measures taken to offset residual effects, i.e. where mitigation in situ is not possible; and
- Enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary.

3.0 Baseline Ecological Conditions

3.1 Designated Sites

3.1.1 Statutory Designated Sites

The Site and its immediate surroundings do not contain any statutory designated sites; however, nine sites exist within 5 km of the Site and are described in Table 3-1 below. These comprise four Sites of Special Scientific Interest (SSSI) relating to ecology, two geological SSSIs, one Area of Outstanding Natural Beauty (AONB)/ National Landscape, one Special Area of Conservation (SAC), and one Local Nature Reserve (LNR).

Perton Roadside Section and Quarry SSSI and Little Hill SSSI and are geological designations and do not contain any ecological designations. Therefore, these have been excluded from further discussion.

There is a habitat connection between the River Frome, which runs through the Site, and River Lugg SSSI and River Wye SSSI and SAC, as these are downstream from the River Frome. Therefore, these have been included for further discussion.

There are no identified ecological pathways for significant effects between the Site and the remaining statutory sites. Therefore, these have been excluded from further discussion.

Due to the nature of the development, being a solar scheme, the statutory sites would not be affected by any increase in recreational pressures or significant additional vehicle movements.

Table 3-1: Statutory designated sites

Site Name and Designation	Reason for Designation	Distance from Site[12]
Perton Roadside Section and Quarry SSSI	Geological designation	970 m
Wye Valley AONB/ National Landscape	"*Breath-taking views, impressive geology, historic legacies, and diverse wildlife.*"	2.6 km
Little Hill SSSI	Geological designation	2.8 km
River Wye SAC	Annex I habitats and annex II species	3.8 km
River Lugg SSSI	Riverine fauna – white clawed crayfish (*Austropotamobius pallipes*), Eurasian otter (*Lutra lutra*), Atlantic salmon (*Salmo salar*), bullhead (*Cottus gobio*), Twaite shad (*Alosa fallax*), and brook lamprey (*Lampetra fluviatalis*).	3.8 km
Sharpnage Wood SSSI	Important mixed broadleaved woodland.	4.2 km
Scutterdine Quarry SSSI	Geological designation	4.5 km
Broadmoor Common LNR	Fine example of flower-rich ancient grassland.	4.7 km
River Wye SSSI	Diversity of riverine plant and animal communities.	4.8 km

3.1.2 Non-Statutory Designated Sites

There are five Special Wildlife Sites (SWS), within 2 km of the Site, described in Table 3-2 below. SWS is the Herefordshire equivalent of a Local Wildlife Site (LWS).

The Site contains part of the River Frome SWS, which runs along part of the Site's northern boundary. Therefore, this will be included for further discussion.

There are no identified ecological pathways for significant effects between the Site and the remaining SWS sites. Therefore, these have been excluded from further discussion.

Table 3-2: Non-statutory designated sites

Site Name and Designation	Citation provided by HBRC	Distance from Site[13]
River Frome SWS SO65/10	"*A steep-sided stream, with a thick wooded margin of alder, with hazel, cherry and pollarded willow.*	Within Site Boundary

[12] At closest point, measured 'as the crow flies'.

[13] At closest point, measured 'as the crow flies'.

Site Name and Designation	Citation provided by HBRC	Distance from Site[13]
	Freshwater mussels are present and kingfishers are frequently seen."	
Perton Roadside Section and Quarry SWS SO53/24	"*A site which has yielded some interesting fossils.*" No ecological citation provided.	970 m
Woodland on Shucknall Hill SWS SO54/09	"*Westhide Wood. Withington and Staples Hole Coppices. Hillend Grove. Rough Plantation. An ancient woodland with some larch and sweet chestnut. Oak is the dominant tree, with hazel* *coppice. The ground flora includes deadly nightshade and wild daffodil. The track up to the wood from 589427 has a rich limestone flora.*"	1 km north
Woodland along Seager Hill SWS SO63/05	"*Dormington, Priors and Cosington Woods. The Plantation. Little Hill. Middle Park. The Nighbrooks. Park Coppice.* *The major part of this woodland is ancient and some of it is still semi-natural.* *Oak is dominant and there are some fine old yew trees. The ground flora is excellent and includes* *bluebell and abundant wild daffodils.* *Little Hill is an important site for the study of the geology of Wenlock limestone and also supports* *a colony of pearl-bordered fritillary.*"	1.2 km southeast
Backbury Hill SWS SO53/24	"*Backbury Hill, Broomy Green, Broad Grove, Fern Hope, Prior's Court and Frith Woods.* *An area of assorted woodlands and scrub-invaded grassland.* *Areas of conifer and ancient semi-natural woodland are intermingled. Amongst the species are yew, wayfaring tree and coppiced oak. The ground flora is very good and includes meadow saxifrage, wild daffodil and primrose.*"	1.5 km southwest

3.2 Habitats

A summary of the habitats, their extent and condition, within the Site is provided in Table 3-3 below and detailed in the following sections. A map of habitats present within the red line boundary is provided as Drawing 1 UK Habitat Survey map.

Of the habitats listed below, the following habitats on Site are considered to be of local importance and have therefore been brought forward for further assessment:

- Native hedgerow; and
- Rivers and streams.

Table 3-3: Summary of habitats within the Site

Baseline Habitat (UKHab Code[s])	Baseline Condition	Extent
Area habitats (ha)		
Cropland – Rye-grass and clover ley (c1b5)	N/A	4.41
Cropland – Other non-cereal crops (c1d8)	N/A	4.81
Modified grassland (g4)	Poor	19.1
Other neutral grassland (g3c)	Moderate	0.28
Bramble scrub (h3d)	N/A	0.04
Hawthorn Scrub (h3f)	Moderate	0.011
Hawthorn Scrub (h3f)	Poor	0.011
Other rivers and streams (r2b) (footprint)	N/A	0.52
Other broadleaved woodland (w1g)	Moderate	0.05
Artificial unvegetated, unsealed surface (u1c)	N/A	0.004
Individual trees (secondary code 200 or 203)	Good	0.17
Individual trees (secondary code 200 or 203)	Moderate	0.9
Linear habitats (km)		
Native hedgerow (h2a6)	Good	0.128
	Moderate	0.766
	Poor	0.019
Native hedgerow with trees (h2a6 11)	Moderate	0.08
Ditch (r1g, 50)	Poor	1.911
Culvert (r1g, 851)	N/A	0.02
Other rivers and streams (r2b) – River Frome	Fairly Poor	0.6
Other rivers and streams (r2b) – Tributary to River Frome	Fairly Poor	1.07
Total extent: Area habitats		**30.16 ha**
Total extent: Area habitats (excluding area of individual trees)		**29.90 ha**
Total extent: Linear habitats - hedgerows		**0.989 km**
Total extent: Linear habitats - watercourses		**3.601 km**

3.2.1 Cropland (c1)

The cropland habitats detailed below are common and widespread, are not priority habitats, and are of less than local importance. Therefore, they have been excluded from further assessment.

3.2.1.1 Rye-grass and clover ley (c1b5)

The southern field had an outer boundary, c.20-30 m wide, which comprised of new growth of perennial ryegrass (*Lolium perenne*) and white clover (*Trifolium repens*) (Plate 1).

Plate 1 Rye-grass and clover ley. Habitat parcel reference B2.

3.2.1.2 Other non-cereal crops (c1d8, 510)

The middle area of the southern field comprised bare ground, with occasional dead remains of the previous non-cereal crop.

Plate 2 Bare ground used for non-cereal crop. Habitat parcel reference B21.

3.2.2 Modified grassland, cattle grazed (g4, 101)

The three northern fields all comprised modified grassland used as pasture for cattle grazing. Species richness was poor, with an average of three species per square metre.

Species comprised a dominance of perennial ryegrass (with over 75% coverage); frequent Timothy grass (*Phleum pratense*), meadow buttercup (*Ranunculus acris*); occasional creeping buttercup (*Ranunculus repens*), broad-leaved dock (*Rumex obtusifolius*), cut-leaved cranesbill (*Geranium dissectum*); and rare occurrences of meadow foxtail (*Alopecurus pratensis*), white clover (locally abundant at field edges), hogweed (*Heracleum sphondylium*), dandelion (*Taraxacum* agg.), and mouse-ear chickweed (locally frequent at edges).

A small 0.084 ha area in the western pasture field is seasonally wet and was flooded at the time of survey. It contained no aquatic vegetation. Species at the fringes and emerging from the water comprised a dominance of perennial ryegrass and Timothy grass; frequent creeping buttercup; and occasional meadow buttercup.

This is a common and widespread habitat, which is not a priority habitat, and is of less than local importance. Therefore, it has been excluded from further assessment.

Condition: Poor (fails criteria A, B)

Plate 3 Pasture grassland. Habitat parcel reference B13.

Plate 4 Flooded area. Habitat parcel reference B16.

3.2.3 Other neutral grassland with scattered trees (g3c, 16, 32)

Grassland running adjacent to the River Frome contained scattered trees and patches of trees, with trees ranging from semi-mature to mature. Stands of tall forbs were frequent to abundant. This grassland has no evident mowing or grazing regime and vegetation is expected to be tall in summer months.

In unshaded areas (Plate 5), species comprised a dominance of nettle (*Urtica dioica*); abundant; perennial ryegrass, and cleavers (*Galium aparine*); frequent white dead-nettle (*Lamium album*) and cock's-foot (*Dactylis glomerata*); occasional red campion (*Silene dioica*), broad-leaved dock, hogweed, creeping thistle (*Circium arvense*), hops (*Humulus lupulus*), great willowherb (*Epilobium hirsutum*), ground ivy (*Glechoma hederacea*), hemlock (*Conium maculatum*) (locally dominant); and rare occurrences of burdock (*Arctium minus*); wild angelica (*Angelica sylvestris*); garlic mustard (*Alliaria petiolata*) and teasel (*Dipsacus fullonum*).

Areas under the shade of trees, species comprised a dominance of ground ivy and ground elder; abundant nettle; frequent cow parsley (*Anthriscus sylvestris*) and lesser celandine (*Ficaria verna*); occasional cuckoo pint (*Arum maculatum*), Himalayan balsam (*Impatiens glandulifera*), ivy (*Hedera helix*); and rare occurrences of hogweed.

Tree species included crack willow (*Salix fragilis*), ash (*Fraxinus excelsior*) alder (*Alnus glutinosa*), and poplar (*Populus* sp.).

This is a common and widespread habitat, which is not a priority habitat, and is of less than local importance. Therefore, it has been excluded from further assessment.

Condition: Moderate (fails criteria B, E)

Plate 5 Other neutral grassland. Habitat parcel reference B7.

3.2.4 Bramble Scrub (h3d)

Two small areas of bramble scrub were present on Site (Plate 6). Typical species present included a dominance of bramble (*Rubus fruticosus* agg.) and frequent to occasional hawthorn (*Crataegus monogyna*). The larger patch of bramble scrub (Habitat parcel reference B10) additionally comprised abundant elder (*Sambucus nigra*) and hemlock.

This is a common and widespread habitat, which is not a priority habitat, and is of less than local importance. Therefore, it has been excluded from further assessment.

Condition: Poor (automatic condition score based on habitat type)

Plate 6 Bramble scrub at base of pylon. Habitat parcel reference B20.

3.2.5 Hawthorn scrub (h3d)

Two small areas of hawthorn scrub were present on Site. One area, near the southern end of ditch D2 included a dominance of hawthorn. Another area, running adjacent to ditch D3, overhangs from off-Site. Species here comprised a dominance of hawthorn and nettles; abundant bramble; frequent harts tongue fern (*Asplenium scolopendrium*); occasional, elder, goat willow (*Salix caprea*) and poplar sp.; and rare occurrences of cuckoo pint.

This is a common and widespread habitat, which is not a priority habitat, and is of less than local importance. Therefore, it has been excluded from further assessment.

Condition (B10): Moderate (fails criteria B, D)

Condition (B15): Poor (fails criteria A, B, D, E).

Plate 7 Hawthorn scrub. Habitat parcel reference B15.

3.2.6 Other broadleaved woodland, semi-natural woodland (w1g, 30)

Two small areas of woodland were present on Site, located along the southern edge of the River Frome.

Tree species generally comprised a dominance of either willow spp. or alder; occasional hawthorn; and occasional to rare occurrences of elder. Tree ages ranged from young to mature.

Ground level species comprised a dominance of nettle; abundant cleavers and timothy grass; frequent ground ivy, common ivy (on trees), lesser celandine and broad-leaved dock; occasional hogweed, Himalayan balsam and cow parsley; occasional red campion and wood avens (*Geum urbanum*); and rare occurrences of common burdock and cuckoo pint.

'Wooded margin' is mentioned as part of the River Frome SWS citation and the two woodlands on Site form a small part of this wooded margin. However, this is a common and widespread habitat, there are no veteran or ancient trees, it is not a priority habitat, and is assessed as having less than local importance. Furthermore, these woodlands are set to be retained and would benefit from an enhanced buffer from the fields to the south. Therefore, this habitat has been excluded from further assessment.

Condition (B17): Moderate (score: 29)

Condition (B18): Moderate (score: 28)

Plate 8 Woodland. Habitat parcel reference B17.

Plate 9 Woodland. Habitat parcel reference B18.

3.2.7 Artificial unsealed, unvegetated surface (u1c)

Two small areas were present on-Site. A small access bridge (habitat parcel reference B5), and a gravel paved field access point (habitat parcel reference B12).

This habitat type has no significant ecological value and has therefore been excluded from further assessment.

Plate 10 Access bridge (habitat parcel reference B5).

3.2.8 Native hedgerow (h2a6)

Native hedgerows on-Site are detailed in Table 3-4. Hedgerows generally comprised a dominance of hawthorn and/ or blackthorn (*Prunus spinosa*) with frequent to occasional

bramble. Low frequencies of additional species were present in most hedgerows, including ash, and willow species. One hedgerow (H4) comprised a dominance of snowberry (*Symphoricarpos albus*).

Native hedgerows are a priority habitat and have therefore been included for further assessment.

Table 3-4 Native hedgerows

No.	Plate	Description	Length (km)
H1		Hedgerow with several gaps along its length. **Condition:** Moderate (fails criteria B2, C1, C2)	0.281
H2		Hedgerow with two large gaps. **Condition:** Moderate (fails criteria B2, C1, C2)	0.139
H3		Hedgerow with trees, running alongside the tributary to the River Frome. The additional species of field elm (*Ulmus minor*) was present within the hedgerow. **Secondary code:** 11 – Hedgerow with trees **Condition:** Moderate (fails criteria C1, C2, E1)	0.075
H4		Hedgerow dominated by snowberry, with abundant hawthorn; frequent blackthorn; and rare occurrences of ash and willow sp. **Condition:** Good (fails criterion C1)	0.128

No.	Plate	Description	Length (km)
H5		Small hedgerow with access gate in the middle. **Condition:** Poor (fails criteria A1, B2, C1, C2)	0.019
H6		Hedgerow dominated by hawthorn. **Condition:** Moderate (fails criteria C1, C2)	0.232
H7		Defunct hedge dominated by elder. **Condition:** Moderate (fails criteria B1, C1, C2, D1)	0.114

3.2.9 Ditches (r1g, 50)

Ditches on-Site are detailed in Table 3-5. The condition of all ditches was Poor.

Two culverts (r1g, 851) are also present on Site (Plate 11).

Ditches on Site are a common and widespread habitat, which is not a priority habitat, and therefore the ditches are of less than local importance. Culverts and drainage pipes hold no significant ecological value. Therefore, these habitats have been excluded from further assessment.

Plate 11 Ditch and drainage pipe located to the east of habitat parcel reference B8.

Table 3-5 Ditches

No.	Plate	Description	Length (km)
D1		Shallow ditch next to hedgerow. Recently dug out. **Condition:** Poor (fails criteria A, B, E, F)	0.111
D2		Shallow ditch between fields. Dries near both ends. **Condition:** Poor (fails criteria B, C, F)	0.212
D3		Ditch running between pasture field and wooded bank. **Condition:** Poor (fails criteria A, B, F)	0.057

No.	Plate	Description	Length (km)
D4		Shallow ditch running alongside hedgerow. **Condition:** Poor (fails criteria A, B, F)	0.144
D5		Shallow ditch running alongside hedgerow. **Condition:** Poor (fails criteria A, B, C, F)	0.321
D6		Shallow ditch. **Condition:** Poor (fails criteria A, B, C, F)	0.24
D7		Shallow, relatively dry ditch, containing small pools of surface water. Recently cleared/ managed. Runs alongside hedgerow. **Condition:** Poor (fails criteria A, B, D, F)	0.114

No.	Plate	Description	Length (km)
D8		Ditch with visible flow. Water mainly coming from culvert (Plate 11) at east end and flowing westwards. **Condition:** Poor (fails criteria A, B, D, F)	0.53
D9		Shallow ditch with pooled water. Flows into ditches at either end of ditch at higher water levels **Condition:** Poor (fails criteria A, B, D, E, F)	0.182

3.2.10 Other rivers and streams (r2b)

The Site contains part of the River Frome SWS, which runs along the northwest boundary of the Site, and an unnamed tributary of the River Frome, which runs through the middle of the Site from east to southwest. A description of these watercourses and a summary of their River Condition Assessment baselines are provided in Table 3-6.

No other river or stream watercourses lie within 10 m of the Site boundary.

Both the River Frome and it's tributary are connected to the downstream statutory designated site of River Lugg SSSI, which then connects to the River Wye SSSI and SAC further downstream. Furthermore, the River Frome is a Local Wildlife Site. Therefore, both watercourses are assessed as being of local importance and have been included for further assessment.

Table 3-6 Rivers and streams

Lengths describe extent of watercourses relevant to Site area.

Plate	Description	Length (km)
 	**River Frome** The River Frome flows along the northwest part of the Site, within the Site boundary. The section of watercourse within the Site was predominantly bordered by mature scattered trees and small patches of woodland, with a buffer strip of grassland on either side; the grassland to the north was outside of the survey area so has not been classified, the grassland to the south was tall neutral grassland (see Section 3.2.3: Other neutral grassland with scattered trees (g3c, 16, 32)). Both bank tops comprise managed agricultural land, resulting in riparian encroachment. The area to the north was arable, the area to south is grassland pasture, grazed by cattle. Invasive non-native species (INNS) Himalayan balsam was found along the bank sides and tops. **Secondary code:** 47 Freshwater – natural **MoRPh River Condition Assessment (RCA)** The calculated MoRPh River Type of Frome River was K - an unconfined, straight-sinuous alluvial channel with silt as the average alluvial bed material size class. The River Shape score indicated that the watercourse is 'highly likely' to be overdeep, which has led to downgrading of the condition by one category. **RCA Baseline Condition**: Fairly Poor (down-classed from Moderate due to being 'overdeep')	0.6

Plate	Description	Length (km)
	River Type: K – Straight/sinuous **Confinement:** Unconfined **Coarsest bed material:** Clay **Average bed material:** Clay **Preliminary score:** 0.996 **Overdeep:** Yes	
 **East**  **Central**  **West**	**Tributary of River Frome** The unnamed tributary of the River Frome flows through the Site from east to southwest and joins the River Frome c. 0.491 km downstream after leaving the Site boundary. The watercourse is heavily modified and ditch-like, with steep banks which are managed for drainage purposes. The section of watercourse within the Site was predominantly bordered by a small strip of modified grassland; with two short sections of hedgerow present in the eastern half, and hedgerow along the north side of the eastern third. The area to the north predominantly comprised grassland pasture, seasonally grazed by cattle; with commercial orchard further west. The area to the south comprised arable land. No INNS were noted within the watercourse or its riparian zone. **Secondary code:** 48 Freshwater – heavily modified **MoRPh River Condition Assessment (RCA)** The calculated MoRPh River Type of the tributary was K - an unconfined, straight-sinuous alluvial channel with silt as the average bed material size class. The River Shape score indicated that the watercourse is 'highly likely' to be overdeep, which has led to downgrading of the condition by one category.	1.07

Plate	Description	Length (km)
	RCA Baseline Condition: Fairly Poor (down-classed from Moderate due to being 'overdeep') **River Type**: K – Straight/sinuous **Confinement:** Unconfined **Coarsest bed material:** Gravel-Pebble **Average bed material:** Silt **Preliminary score:** 0.823 **Overdeep:** Yes	

3.2.11 Individual trees

Individual trees present within the Site were predominantly located alongside the River Frome as scattered trees within the neutral grassland, with ages ranging from semi-mature to mature, and sizes ranging from small to very large. These trees would be retained; furthermore, they are within the protected buffer zone of the River Frome SWS. Additionally, there are a small number of semi-mature trees within the Site, located at the field edge or within hedgerows, which are also set to be retained.

Tree species included crack willow, willow, ash, alder, poplar, and oak (*Quercus* sp.). No trees constituting priority habitat (i.e. ancient or veteran trees) were noted within the Site or its proximity.

'Wooded margin' is mentioned as part of the River Frome SWS citation and the majority of individual trees on Site are part of this wooded margin.

However, this is a common and widespread habitat, there are no veteran or ancient trees, and is assessed as having less than llocal importance. Furthermore, these trees are set to be retained and would benefit from an enhanced buffer from the fields to the south. Therefore, individual trees have been excluded from further assessment.

A summary of tree sizes and condition are provided in Table 3-7.

Table 3-7 Summary of the number of trees based on size class and condition

Tree size	Condition		
	Poor	Moderate	Good
Small		6	
Medium		4	9
Large			2
Very large			1
Total		**10**	**12**

Plate 12 Alder and willow tree on south bank of River Frome. Tree reference T1, T2.

3.3 Species

3.3.1 Notable and Invasive Flora

The desk study returned several records of bluebell (*Hyacinthoides non-scripta*), a Schedule 8 protected species under the Wildlife and Countryside Act 1981 (as amended). None of the records relate to the Site itself. The closest record belongs to a woodland 1.15 km southeast of Site.

No bluebells were found to be present within the Site during the survey and the development would not affect any suitable woodland habitat. Furthermore, the Site does not contain any habitat of botanical interest. Therefore, notable flora have been scoped out from further assessment.

Himalayan balsam, a Schedule 9 invasive non-native species, was recorded on Site, restricted to the riverbank of the River Frome. The Himalayan balsam would be managed as part of the amelioration of the river condition; therefore, Himalayan balsam has been included for further assessment.

3.3.2 Invertebrates

3.3.2.1 Freshwater mussel

Registry details of the River Frome SWS, provided by HBRC, note that freshwater mussel is present within the river; however, the specific species has not been disclosed. No records of freshwater mussel species were returned within a 2 km radius of the Site; however, freshwater mussels may be present further downstream. As it cannot be ascertained

whether the noted species is a priority species or not, it has been included for further discussion as a precautionary measure.

3.3.2.2 Terrestrial invertebrates

The habitats within the core of the Site are unlikely to support a locally significant population for terrestrial based invertebrate species, due to predominantly comprising habitats that are commonly occurring and species-poor. However, there are a number of mature trees and tall grassland vegetation present along the riparian zone of the River Frome, which may provide good habitat for invertebrates. Therefore, terrestrial invertebrates have been included for further discussion.

3.3.3 Amphibians

A total of four records of great crested newt were returned within a 2 km radius of Site. Two of the records originate from a pond which lies c.2 km away from the Site, and is separated from it by the A438. The other two records originate from near the River Frome, c.1.1 km northeast of Site. No amphibians were recorded during the Site visit.

For great crested newt, results of the Habitat Suitability Index and eDNA surveys are presented below.

3.3.3.1 Habitat Suitability Index (HSI) Surveys

All ponds surveyed were located off-Site but within a 250 m buffer of the Site boundary. A description of each pond and the result of the HSI assessments are provided in Table 3-8. In summary, two ponds scored as Good (P2 and P3) and one pond scored as Average (P1).

Factor scores used to calculate the habitat suitability index score are included as Appendix E.

Table 3-8 Habitat Suitability Index (HSI) for great crested newt survey results

Pond	Description	Photograph	HSI score
P1	Grid reference: SO 59693 41973 Very large pond surrounded by a line of trees. Wider area is predominantly agricultural, with tree and hedgerow wildlife corridors present.		0.65 Average

Pond	Description	Photograph	HSI score
P2	Grid reference: SO 59654 41488 Large pond completely surrounded by woodland.		0.72 Good
P3	Grid reference: SO 59650 41410 Small to medium sized pond which was larger than how it is shown on OS (and other) mapping. It is possible that the pond seasonally floods causing the size to fluctuate.		0.76 Good

3.3.3.2 eDNA Surveys – great crested newt

Great crested newt eDNA results are summarised in Table 3-9. Full results are included as Appendix F.

One pond, P3, located within woodland, approximately 55 metres from the southern Site boundary, tested positive for the presence of great crested newt eDNA. The remaining two ponds tested negative (i.e. GCN eDNA absent). Given the confirmed presence of GCN in the local area, amphibians, including great crested newt are therefore included for further assessment.

Table 3-9 Great crested newt eDNA results

Pond	eDNA Result
P1	Negative
P2	Negative
P3	Positive

3.3.4 Reptiles

Records of reptiles were returned within a 2 km radius of the Site. This consisted of four records for grass snake (*Natrix helvetica*). These were located both to the northeast of Site and to the south.

A small number of reptiles, ostensibly grass snake, may move through the Site on a transitory basis. There is potential habitat for grass snake on Site, namely the tall neutral grassland running alongside the River Frome to the north of the Site. However, the shorter, cow grazed sward of the grasslands in the northern area, and the arable field in the southern area, are unsuitable for reptiles. It is unlikely that an important or critical population of reptiles are found within the Site, and the Site is considered to be of less than local value to reptiles. If reptiles do occur on Site, they are likely to be restricted to the northern neutral grassland area which would be retained. Therefore, reptiles have been excluded for further assessment.

3.3.5 Birds

Records were returned for 58 species of birds within a 2 km radius of the Site boundary. Eight of those species are listed on Schedule 1 of the Wildlife and Countryside Act 1981; namely barn owl (*Tyto alba*), fieldfare (*Turdus pilaris*), goshawk (*Accipiter gentilis*), hobby (*Falco subbuteo*), kingfisher (*Alcedo atthis*), peregrine (*Falco peregrinus*), red kite (*Milvus milvus*), and redwing (*Turdus iliacus*). These species are considered unlikely to nest within the Site. Though mature trees are present, none of them contained hollows suitable for barn owl nesting.

Furthermore, 20 of the species are on the Red List of the birds of conservation concern (BoCC); namely cuckoo (*Cuculus canorus*), curlew (*Numenius arquata*), fieldfare, grey partridge (*Perdix perdix*), hen harrier (*Circus cyaneus*), herring gull (*Larus argentatus*), house martin (*Delichon urbicum*), house sparrow (*Passer domesticus*), kingfisher, lapwing (*Vanellus vanellus*), lesser spotted woodpecker (*Dryobates minor*), linnet (*Linaria cannabina*), marsh tit (*Poecile palustris*), mistle thrush (*Turdus viscivorus*), redpoll (*Acanthis flammea*), skylark (*Alauda arvensis*), starling (*Sturnus vulgaris*), swift (*Apus apus*), tree sparrow (P*asser montanus*), spotted flycatcher (*Muscicapa striata*), tree sparrow (*Passer montanus*), turtle dove (*Streptopelia turtur*), and yellowhammer (*Emberiza citrinella*).

A further 14 species are on the Amber List of the BoCC; namely bullfinch (*Pyrrhula pyrrhula*), dunnock (*Prunella modularis*), kestrel (*Falco tinnunculus*), lesser black-backed gull (*Larus fuscus*), mallard (*Anas platyrhynchos*), marsh harrier (*Circus aeruginosus*), moorhen (*Gallinula chloropus*), redwing, song thrush (*Turdus philomelos*), sparrowhawk (*Accipiter nisus*), tawny owl (*Strix aluco*), whitethroat (*Curruca communis*), willow warbler (*Phylloscopus trochilus*), and wren (*Troglodytes troglodytes*).

Birds recorded incidentally during the fieldwork included two skylark (singing above and/ or in the vicinity of the Site), a red kite circling above the Site on one occasion and a kingfisher along the River Frome, on the southern Site boundary.

The majority of habitat with suitability for nesting birds is restricted to hedgerows and trees on field boundaries; however, the Site does have some potential to support ground nesting birds such as skylark, in low numbers.

Overall the Site is assessed as being of less than local importance for nesting birds.

However, due to the legal protection afforded to nesting birds while nesting, under the Wildlife and Countryside Act 1981 (as amended), breeding birds have been included for further assessment.

The Site is considered as unlikely to be of importance for wintering birds due to the absence of SPA sites, coastal areas, or large wetland waterbodies of significance to wintering birds within the local area. Therefore, any impact on wintering birds is unlikely to be significant and wintering birds have been excluded from further assessment.

3.3.6 Mammals

3.3.6.1 Bats

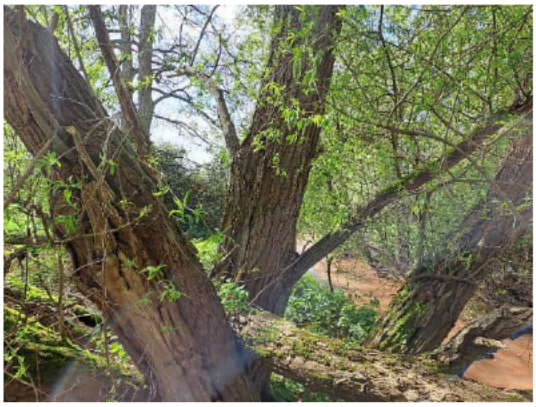
A total of 146 records of bats were returned within a 2 km radius of the Site boundary. In order of most to least abundant in terms of number of records (not numbers of bats) these were: common pipistrelle (*Pipistrellus pipistrellus*), lesser horseshoe bat (*Rhinolophus hipposideros*), soprano pipistrelle (*Pipistrellus pygmaeus*), 'unidentified bats', long-eared bat sp. (*Plecotus* sp.), Daubenton's (*Myotis daubentonii*), unidentified *Myotis* bats (*Myotis* sp.), pipistrelle sp. (*Pipistrellus* sp.), brown long-eared bat (*Plecotus auritus*), noctule (*Nyctalus noctula*), and Natterer's (*Myotis nattereri*).

Hedgerow, tree, woodland and watercourse features on Site are likely to be of importance to foraging and commuting bats. The core of the Site, comprising grazed modified grassland and arable fields, is likely to be of little importance to bats.

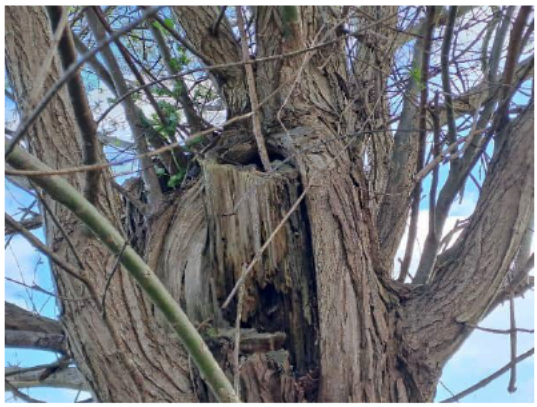
The Site and its boundaries contain mature trees, of which some were found to have suitability for roosting bats either due to age, presence of splits, rot holes, raised bark, dense ivy cover or a combination of these features. Assessing the suitability for roosting bats, a total of six trees were assessed as PRF-M, and four trees were assessed as PRF-I. Two of the trees assessed as PRF-I were located off-Site but overhanging the boundary; namely T17 and T18. Trees with bat roosting potential are detailed in (Table 3-10) below.

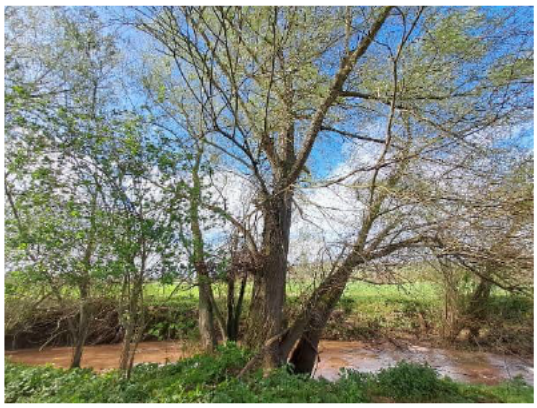
Overall, due to the presence of mature boundary features and watercourses, as well as trees with roosting suitability, the Site is considered to be of local importance to bats. Therefore, this group has been included for further assessment.

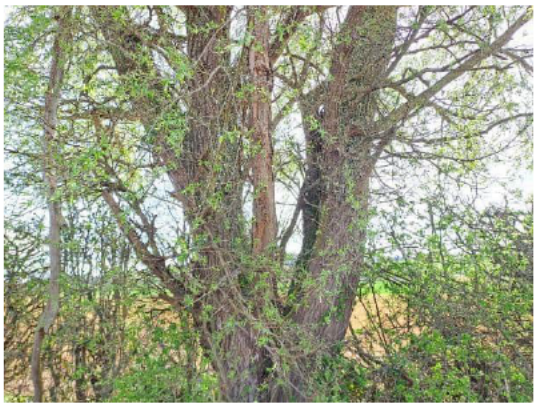
Table 3-10 Trees with bat roosting potential

Ref.	Description and photographs
T2	 
	Very large, mature willow tree. Numerous cracks but not many that would remain dry and protected from the wind. **Roosting suitability:** PRF-I

Ref.	Description and photographs
T7	 
	Large, mature crack willow tree. Loose bark on trunk and larger branches. Small holes at trunk base. Bent/ snapped large branch creating gaps, one with old birds nest inside. **Roosting suitability:** PRF-M
T8	
	Medium sized crack willow. **Roosting suitability:** PRF-I
T10	 
	Mature crack willow within small woodland. **Roosting suitability:** PRF-M

Ref.	Description and photographs
T11	   
	Mature crack willow. PRFs include woodpecker holes on northwest (river) side, at 8 and 10 m height, and a cracked limb at 10 m height. **Roosting suitability:** PRF-M
T12	   

Ref.	Description and photographs
	Mature willow with multiple PRF-I features including knot holes and loose bark. **Roosting suitability:** PRF-M
T13	  
	Large, mature willow. No significant PRFs but a number of small ones comprising small areas of loose bark on the trunk and splits in an upper branch. **Roosting suitability:** PRF-M
T14	 
	Standing dead wood with two woodpecker holes at height of c. 8 m. **Roosting suitability:** PRF-I

Ref.	Description and photographs
T17	 
	Mature willow, growing off Site. Some very small gaps and cracks in bark. **Roosting suitability:** PRF-I / FAR –only the north half of tree could be surveyed.
T10	 
	Mature willow, growing off Site. Some very small gaps and cracks in bark. **Roosting suitability:** PRF-I / FAR – only the north half of tree could be surveyed.

3.3.6.2 Badger

[redacted]

3.3.6.3 Otter

The desk study returned 13 records of otter (*Lutra lutra*) within a 2 km radius of the Site. Eight of these records were of otter scat found on-Site by the River Frome in 1991 and 1992. The remaining records belong to dead specimens found by the roads in the wider area recorded between 2002 and 2015.

During the Site visit, otter scat was found on a tree on the south bank of the River Frome alongside footprints (Drawing 1: Target Note 3). These signs were close to the water level. No holts were identified. A mammal track leading into the river was noted on the opposite side of the river, off-Site.

Due to the low water levels and narrow channels of the unnamed tributary and the ditches on-Site, these watercourses are considered suboptimal for otter.

Due to the presence of signs indicating recent otter activity, their protected status, and the importance of the River Frome as a river habitat within the landscape, the Site is assessed as having local importance for otter. Therefore, otter has been included for further assessment.

Plate 13 Otter scat and location on tree.

Plate 14 Mammal track leading into the river from north bank.

3.3.6.1 Water vole

No records of water vole were returned in the desk study data. No tracks or signs of water vole were found during the ecological survey. However, given their protected status and the

presence of potential suitable habitat in and around the Site, water vole has been included for further discussion.

3.3.6.2 Hazel Dormouse

Two records were returned for hazel dormouse. The most recent of which was c.1.9 km southeast of Site in 2013, the other was recorded c.1.5 km north-northwest of the Site in 1991. Limited amounts of suitable habitat, in the form of hedgerows, scrub and woodland edge is present within the Site.

Field surveys have not yet been conducted for hazel dormouse, these will be carried out using nest tubes between June and November 2024 inclusive, with results being provided as a Supplementary Ecological Information (SEI) report.

Due to previous records of hazel dormouse in the local area, hazel dormouse has been included for further discussion.

3.3.6.3 Other Mammals

Within 2 km of the Site, the desk study returned 17 records of hedgehog (*Erinaceus europaeus*), 12 records of polecat (*Mustela putorius*), the closest record being within 500 m of the Site, and two records of brown hare (*Lepus europaeus*).

Arable land habitat has little suitability for hedgehog, with recent research suggesting hedgehogs avoid arable fields (such as the southern field), and show preference toward grassland and rural gardens. Due to the potential for the proposals to improve the Site for hedgehog, this species has been brought forward for further assessment.

No hare were recorded on-Site during the surveys; however, this species is known to use arable land and grassland. Although the Site is based in the open countryside with an abundance of arable fields outside of the Site, each field is likely to contribute to a network of habitat for hare. Therefore, the Site is considered to be of up to local importance for brown hare, and this species has been brought forward for further assessment.

No polecat were recorded on-Site during the surveys; however, this species is known to use arable land, grassland and woodland. Although the Site is based in the open countryside with an abundance of arable fields outside of the Site, each field is likely to contribute to a network of habitat for polecat. Therefore, the Site is considered to be of up to local importance for polecat, and this species has been brought forward for further assessment.

3.4 Summary of Important Ecological Features

Designated sites and/ or habitats and species which are present on Site, or occur locally, which have been assessed as having local ecological importance or greater, or which are afforded legal protection, and which could potentially be affected by an unmitigated scheme are summarised in Table 3-11. Where features have been omitted from detailed assessment (due to no potential impacts arising or their less than local ecological importance), a rationale has been provided.

Table 3-11 Summary of Important Ecological Features Subject to Detailed Assessment

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and/or Importance
River Wye SAC	International	The River Frome is a tributary of the River Lugg, which is a tributary of the River Wye that is designated as a Special Area of Conservation.
River Lugg SSSI, River Wye SSSI	National	The River Frome is a tributary of these rivers which are designated as Sites of Special Scientific Interest.
Frome River SWS	Local	Frome River SWS is equivalent to a Local Wildlife Site.
Hedgerows	Local	Native hedgerows constitute a Priority Habitat. Hedgerows have intrinsic value and are likely to support a range of species and are likely to act as general wildlife corridors.
Rivers – Frome River and unnamed tributary	Local	Streams and rivers have intrinsic value and are likely to support a range of species and are likely to act as general wildlife corridors.
Himalayan balsam	N/A	This plant is a Schedule 9, invasive non-native species.
Freshwater mussel	Local	Species unknown. Included as a precaution. A number of freshwater mussels are protected under the Wildlife and Countryside Act 1981 and are Species of Principal Importance (Priority Species) under Section 41 of the NERC Act.
Terrestrial invertebrates	Local	Mature trees, diverse plant communities and varied vegetation structure on Site have potential to support a wide range of terrestrial invertebrates. Invertebrates are an integral part of the ecosystem.
Great crested newt	Local	Three ponds with the potential to support great crested newt are located within 250 m of the Site. Great crested newts are protected under the Conservation of Habitats and Species Regulations 2017. They are also a Species of

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and/or Importance
		Principal Importance (Priority Species) under Section 41 of the NERC Act 2006.
Breeding birds	Less than Local	Boundary features have potential to support hedgerow and tree nesting species. The arable fields have potential to support small numbers of ground nesting species, such as skylark, during years in which an appropriate crop is grown. Two skylark were noted singing above the Site during the fieldwork. All birds and their nests are protected while nesting under Wildlife and Countryside Act 1981 (as amended).
Bats	Local	The Site contains mature hedgerow and tree features suitable for roosting, foraging and commuting bats. Bats are European Protected Species under Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981 (as amended).
Badger	[redacted]	No setts were found on-Site; [redacted] Badgers are protected under Protection of Badger Act 1992.
Otter	Local	The river and its adjacent trees, small woodland, and tall grassland habitats, provide suitable habitat for otter. Otters are protected under Schedule 5 and 6 of the Wildlife and Countryside Act 1981 (as amended), and Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended). They are also a species of principal importance (priority species) under Section 41 of the NERC Act 2006.
Water vole	Less than local	No records of water vole and no tracks or signs found during the ecological survey. Water vole are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). They are also a species of principal importance (priority species) under Section 41 of the NERC Act 2006.
Hazel dormouse	Local	If dormice are found to be present on-Site, the dormouse population is likely to be of Local

Ecological Feature	Scale at which Feature is Important	Comments on Legal Status and/or Importance
		importance, with populations being present across the county of Herefordshire. Dormice are protected under the Wildlife and Countryside Act 1981 (as amended) and The Conservation of Habitats and Species Regulations 2017. They are also a Species of Principal Importance (Priority Species) under Section 41 of the NERC Act 2006.
Hedgehog	Local	The Site has little suitability to support hedgehog at present, however the proposals have potential to provide improved habitats. Hedgehog is a UKBAP priority species, with a Species Action Plan.
Brown hare	Local	Arable land is suitable for use by hare and although no hare were recorded at the time of survey, the Site is likely to contribute to a wider network of habitat which may be used by hare. Brown hare is a species of principal importance (priority species) under Section 41 of the NERC Act 2006, and UKBAP priority species, with a Species Action Plan.
Polecat	Local	Arable, grassland and wooded areas are suitable for use by polecat and although no polecats were recorded at the time of survey, the Site is likely to contribute to a wider network of habitat which may be used by polecat. Polecat are protected under the Wildlife and Countryside Act 1981 (as amended), are a species of principal importance (priority species) under Section 41 of the NERC Act 2006, and UKBAP priority species, with a Species Action Plan.

4.0 Assessment of Effects, including Mitigation and Enhancement Measures

4.1 Embedded Mitigation and Best Practice

The following design principles and "designed-in" mitigation have informed the assessment of impacts:

- Within the design good practice environmental and pollution control measures would be employed with regard to current best practice guidance such as, but not limited to, the following:
  - CIRIA C532, 'Control of water pollution from construction sites: guidance for consultants and contractors' (2001); and
  - CIRIA C741, 'Environmental good practice on site guide' (2015 4th Ed.).

- Precautionary measures to be employed during construction, include:
  - Any excavations to be in-filled within the same day, or if not possible, excavations should be covered or provided with a sloping side (>45%) or ramp to allow wildlife to escape; and
  - Exclusion zones to be maintained around Root Protection Areas of retained trees and hedgerows.

4.2 Designated Sites

4.2.1 River Frome SWS, River Lugg SSSI, River Wye SSI and SAC

4.2.1.1 Potential impacts

The River Frome SWS and its unnamed tributary, which run within the Site, form tributaries of the River Lugg SSSI, which then flows into the River Wye SSI and SAC. In the absence of mitigation, there is the potential for habitats and their associated flora and fauna to be damaged by construction activities; for example, as a result of water pollution adversely affecting water quality.

4.2.1.2 Proposed mitigation measures

Best practice pollution and siltation control measures referenced in Section 4.0 would be employed during construction, to prevent run off into the connected watercourses. Therefore, no impacts which could affect these rivers during construction are predicted.

Once construction is complete, semi-natural grassland would replace agricultural pasture and arable land on-Site, within the 10 m riparian zone of the River Frome and its tributary, which would provide a more natural habitat near the river than exists at present, leading to an enhancement.

Furthermore, no sheep would be allowed to graze within a 10 m buffer of the River Frome and its tributary, to allow for a semi-natural habitat to develop and to protect the watercourse from damage, pollution and eutrophication from livestock grazing activities.

Furthermore, no pesticides or herbicides, which could impact water quality, would be used on Site.

4.2.1.3 Significance of residual effects

Considering the above, it is predicted that there would be no increased human pressures or adverse impacts on the water quality and character of the River Frome, its tributary, and thus the rivers Lugg and Wye downstream, as a result of the development, indeed there could be a minor improvement in water quality. Therefore, the overall impact of the development on the designated sites and features these rivers are designated for, are predicted to be no net change or a minor improvement.

4.3 Habitats

4.3.1 Hedgerows

4.3.1.1 Potential impacts

Loss of hedgerow habitat could cause a reduction of this priority habitat type and break commuting routes.

4.3.1.2 Proposed mitigation measures

All existing hedgerows within the Site would be retained, with the exception of a section of hedgerow H2 which would be modified to provide Site access with a visibility splay. This hedgerow already has a field access gap of c.4 m which would be expanded to c.8 m. A total c.25 m section of this hedgerow would be modified by widening the gap and the remaining area of affected hedgerow being reduced to a height of 0.6 m, through hedgerow laying.

New native species rich hedgerows totalling 0.158 km would be planted alongside ditch D2. Species within the hedgerow mix would comprise greater than five species per 30 m, to ensure they meet the criteria for species rich hedgerows, and would be comprised of a combination of some, or all, of the following species: field maple (*Acer campestre*), elder (*Sambucus nigra*), guelder rose (*Viburnum opulus*), field elm, hazel, alder and holly (*Ilex aquifolium*).

Created habitat classification: Species rich native hedgerow

Predicted ecological condition: Good (predicted failed criterion: C2)[14].

4.3.1.3 Significance of residual effects

Planting of a new species rich hedgerow would increase the overall abundance of this priority habitat within the Site, and improve the connectivity across the Site and provide additional nesting and foraging resource for a range of species. Retention of the majority of existing hedgerows would maintain existing habitat. Overall, the impact on hedgerow habitat within the development is expected to be positive at Local level.

4.3.2 Rivers

4.3.2.1 Potential impacts

The River Frome and its unnamed tributary, run within the Site. In the absence of mitigation, there is the potential for these habitats to be damaged from construction activities; for example, as a result of water pollution adversely affecting water quality. Additionally, sheep grazing alongside ditches which flow into the River Frome or its tributary may also result in water pollution.

4.3.2.2 Proposed mitigation and enhancement measures

The River Frome and its unnamed tributary would not be subject to any bank revetment, any new bridge creation, although an existing bridge will be replaced with a bridge of a similar size, or the existing bridge strengthened. Therefore, no increase in watercourse encroachment is predicted.

Best practice pollution and siltation control measures referenced in Section 4.0 would be employed during construction to prevent runoff into the watercourses during construction.

Semi-natural tussocky grassland would replace agricultural pasture and arable land located within the 10 m riparian zone of the River Frome and the majority of the riparian zone of the unnamed tributary within the Site, which would provide a more natural habitat near the river. Cattle grazing would be removed and no sheep would be allowed to graze within a 10 m buffer of the River Frome and its tributary. This would allow for a semi-natural habitat to develop and protect the watercourse from damage, pollution and eutrophication from livestock grazing activities. Within the grazed area of the solar farm, ditches D2 and D5 would incorporate livestock-proof fencing to create a 5 m buffer from these ditches, which

[14] In line with the Statutory Biodiversity Metric habitat condition assessment criteria.

will be kept free from grazing, to remove riparian encroachment and protect the ditch watercourses from damage, pollution and eutrophication from livestock grazing activities.

Furthermore, no pesticides or herbicides, which could impact water quality, would be used on Site.

The invasive non-native species (INNS), Himalayan balsam, which is present along the banks of the river, would be removed along the southern bank (the northern bank not forming part of the Site).

4.3.2.3 Significance of residual effects

The proposed enhancements are predicted to improve the condition of the River Frome watercourse s from Fairly Poor to Moderate[15]. A minimum 10 m buffer would be retained between the River Frome bank top and any solar farm infrastructure, which would reduce the riparian encroachment on the bank top of one of the sides of the channel, by replacing agricultural pasture with a semi-natural habitat comprising tall tussocky grassland.

For the unnamed tributary, the enhancements are not significant enough to raise the condition category of this watercourse. Therefore, it's condition is predicted to remain at Fairly Poor. Riparian encroachment is predicted to also remain within the same category as at baseline (Major), due to encroachment of some of the solar infrastructure within the 10 m riparian zone, namely a section of security fencing in the east half of the Site, an upgrade to the existing vehicle access bridge and associated track, and the off-Site orchard to the northwest of Site remaining as agricultural land.

With the incorporation of pollution control measures, water quality would not be adversely affected, in fact it is likely to be marginally improved.

4.3.3 Additional habitat enhancements

4.3.3.1 Grassland

Parts of the arable and pasture fields, which form the core of the Site at present, would be enhanced in distinctiveness and condition, by creating and managing the areas as neutral grassland habitat. However, areas to be grazed are expected to be classified as modified grassland if grazing is year-round. Two different wildflower mixes would be sown and appropriately managed to create structural and species diversity across the Site.

To help avoid a dominance of competitive species and to achieve the successful establishment of target species and high species richness, it is recommended that soil nutrient conditions are analysed and, where applicable, ameliorated, prior to sowing of the seed mixes; with an aim to keep soil nutrient levels low, particularly to avoid excess levels of phosphorus which would negate the benefit of mycorrhizal fungi. Introduction of mycorrhizal fungi communities is recommended to achieve target species communities and diversity in the long-term. Note that locally adapted sources of mycorrhizae are significantly more effective than generic commercially available mixes.

The establishment and maintenance of seed mixes would be conducted in accordance with supplier instructions and managed appropriately to encourage biodiversity.

Grassland around and beneath solar arrays

Grassland beneath and immediately around solar arrays within the south field which is currently arable, comprising 4.6 ha, would be sown with a wildflower grassland mix suitable

[15] In line with the Modular River Survey condition assessment criteria.

for grazing, such as Emorsgate EM3 General Purpose Meadow Mixture[16], or similar. Existing grassland in the northern fields, which falls within proposed security fencing areas, would be retained for grazing, any areas damaged during construction would be sown with the same mix as above.

This seed mix area, once established, would be managed by sheep grazing.

Created habitat classification: Modified grassland

Predicted ecological condition: Poor (predicted failed criteria: A, B)[14]

Grassland outside of perimeter fencing

Grassland areas located outside of perimeter fencing, comprising 6.38 ha, would be sown with a tussocky meadow mix such as Emorsgate EM10 Tussock Meadow Mixture[17], or similar, to create a tussocky habitat which would provide a refuge habitat for overwintering invertebrates, small mammals and hedgehog, as well as nesting habitat for some species of ground nesting bird, such as skylark. The seed mix would be supplemented with additional yellow rattle *(Rhinanthus minor*) seeds, to suppress the dominance of grasses and aid establishment of wildflowers from the mix, increasing structural and species diversity.

Within the 10 m wide riparian zone of the River Frome, native scattered scrub would be planted to diversify vegetation structure and create ecological niches for wildlife.

Once established, these grassland areas would be managed infrequently and on rotation, to ensure at least 50% of this habitat is available as an undisturbed refuge for wildlife each year, also leaving patches of tall grass near scrub. The grassland areas would be cut once every 2-3 years, in September or October, with no more than 50% of the grassland area cut in any one year. Cuttings from the main cut would be left in place for 1-7 days to dry and shed seed, before being removed from Site. Removal of clippings would reduce nutrient input into the soil and would, over time, create increasingly favourable soil conditions for supporting a diverse floral community.

Created habitat classification: Other neutral grassland

Predicted ecological condition: Moderate (predicted failed criteria: B, F)[14]

4.3.3.2 Scrub

Two linear areas of mixed scrub, totalling 0.82 ha, would be planted along the southeast and southwest boundaries of the Site. This will create new and enhanced wildlife corridors resulting in better habitat connectivity across the Site, including enhanced connectivity with the existing woodland to the south of the Site which contains great crested newt. New scrub habitat would provide additional nesting and foraging habitat for a range of species.

Created habitat classification: Mixed scrub

Predicted ecological condition: Poor (predicted failed criteria: B, D, E)[14].

4.3.3.3 Trees

A total 37 native trees would be planted in locations along the south, west and east boundaries. Species planted would be of local provenance.

Predicted ecological condition: Moderate (predicted failed criteria: C, E)[14].

[16] EM3 Special General Purpose Meadow Mixture - Emorsgate Seeds (wildseed.co.uk)

[17] EM10 Tussock Meadow Mixture - Emorsgate Seeds (wildseed.co.uk)

4.4 Species

4.4.1 Himalayan balsam

4.4.1.1 Potential impacts

Himalayan balsam is a Schedule 9 invasive non-native species. This species displaces native flora, reduced native biodiversity and can compromise the integrity of riverbanks. The presence of this species on the riverbank likely contributes to seed dispersal, increasing the spread and prevalence of this species further downstream.

4.4.1.2 Proposed mitigation measures

Himalayan balsam would be removed from the south bank of the river (the north bank being off-Site, so outside the remit of this project) and the area managed to supress reestablishment of the species. This would be conducted as part of the river condition amelioration. Removal would be conducted manually; without the use of herbicides as these are also harmful to the wider ecology including invertebrates.

4.4.1.3 Significance of residual effects

The effect of the proposals is predicted to be positive effect at local level.

4.4.2 Invertebrates

4.4.2.1 Freshwater mussel

Potential impacts

Freshwater mussels have the potential to be affected by changes to water quality due to increased surface runoff and pollution.

Proposed mitigation and enhancement measures

Mitigation and enhancement of the river habitats on Site are described in Section 4.3.2.2.

Significance of residual effects

Therefore, no increased human pressures or adverse impacts on the water quality or character of the River Frome, its tributary, and connecting rivers further downstream, are predicted as a result of the development, and as such the overall impact of the development on freshwater mussel is predicted to be no net change.

4.4.2.2 Terrestrial invertebrates

Potential impacts

Grassland management without consideration for wildlife, for example not leaving sufficient refugia when mowing or over grazing, can cause harm to existing invertebrate communities.

Proposed mitigation and enhancement measures

The mature trees and tall, neutral grassland vegetation present adjacent to the River Frome would be retained.

The arable and pasture fields would be enhanced, creating species rich grasslands within the areas outside security fencing, including a greater proportion of forb plants, and a varied vegetation structure. The grassland areas managed by mowing, would be managed infrequently and on rotation to ensure at least 50% of the habitat is available each year as an

undisturbed refuge for invertebrates. Cuttings from mowing would be left in place for 1-7 days which would allow surviving invertebrates to disperse back into the local habitats.

Areas of grassland outside the security fencing would be left ungrazed by sheep year-round. Grassland within the security fencing would be grazed (see Section 4.3.3).

No herbicides, which are also harmful to invertebrates, would be used to manage vegetation, including Himalayan balsam.

Significance of residual effects

Grassland creation and enhancements would improve and significantly expand the available habitat for a diverse range of invertebrates, and as such, the overall impact of the development on terrestrial invertebrates is predicted to be positive at local level.

4.4.3 Great crested newt

4.4.3.1 Potential impacts

The single confirmed GCN breeding pond, located circa 55 metres to the south of the Site within a large woodland block, would not be adversely affected. It is possible that GCN from this breeding pond could be impacted by the scheme, during their terrestrial phase.

4.4.3.2 Proposed mitigation measures

Converting nearby arable land to neutral grassland would improve and increase area of suitable terrestrial habitat (as explained in more detail in Section 4.4.2.2 Terrestrial Invertebrates). Given the distances involved, and the nature of the proposed works, the risk of harming individual GCN, and other species of amphibian, either during construction or operation, is considered negligible.

4.4.3.3 Significance of residual effects

Grassland creation and enhancements would improve and expand the availability of suitable terrestrial habitat for great crested newt. Additionally, increases in invertebrate abundance would provide greater food availability for terrestrial newts/ amphibians. Therefore, the overall impact of the development on great crested newt, and other amphibians, in their terrestrial life stage is predicted to be positive at local level.

4.4.4 Breeding Birds

4.4.4.1 Potential impacts

Potential damage/ destruction of active nests during Site clearance works. Reduction in habitat for ground nesting birds. Loss of suitable habitat, such as hedgerow and trees, could reduce the nesting and foraging provision available to birds.

4.4.4.2 Proposed mitigation and enhancement measures

All mature trees within the Site would be retained, as would the hedgerows (with the exception of modifications to hedgerow H2)

Vegetation clearance during bird nesting season (March - August) would be avoided, or if clearance is required during nesting season, this would commence following a check for nesting birds by a suitably qualified ecologist. If nests are found, these would be protected by an exclusion buffer zone until young have fledged.

The planting of an additional species rich hedgerow alongside ditch D2, as well as new trees and scrub, would improve the availability of nesting sites for breeding birds, as well as providing enhanced foraging opportunities.

Sowing of tall, species rich grasslands, would provide ideal foraging habitat for a range of bird species, as well as nesting opportunities for some ground nesting bird species, including skylark, within larger open areas. Additionally, these grasslands could increase numbers of small mammals which provide feeding opportunities for birds of prey such as owls.

In addition to this, a total of 10 bird boxes would be erected on hedgerow trees around the Site, including two barn owl boxes, providing new nesting opportunities for species of conservation concern. The barn owl boxes would be spaced at least 60 m apart. Box specification and installation instructions are provided in Table 4-1.

Table 4-1: Bird box specification and installation instructions

Type	Specification
Barn Owl Trust Barn Owl Nest Box (or similar) **Quantity: 2**	 Available from: https://www.barnowltrust.org.uk/product/barn-owl-nestbox-for-use-on-trees/
	Further information and installation instructions: • The box should be positioned on a mature individual tree, one of the standing deadwood trees, or a mature tree at the edge of a woodland or hedgerow; • One of the boxes should be positioned in the fields east of Lawn Lane, and one box should be positioned in the fields west of Lawn Lane; • The box would be installed facing east, northeast or southeast (away from prevailing winds); and • The box would be erected with a clear flight path below/ around the entrance, at a minimum height of 4-6 m.
Vivara Pro Seville Nest Box With 32 mm Oval Hole (or similar) **Quantity: 2**	

Type	Specification
	Available from: https://www.nhbs.com/vivara-pro-seville-32mm-oval-woodstone-nest-box
	Installation instructions: • Bird boxes would be attached to a building or sufficiently wide tree trunk or pole, so that it doesn't swing or rotate excessively in the wind; • At a height between 1.5-3 m; • On east, southeast, or northeast facing aspect; and • With a clear flight path in front of the box. **Further information:** • These 32 mm oval hole nest boxes are suitable for blue tits, tree sparrows, great tits, crested tits, nuthatches, coal tits and pied flycatchers. The oval hole is particularly favoured by house sparrows and redstarts, who would use the larger hole to perch to defend their nests from predators and rivals.
Schwegler 1B **Nest box With 26 mm Hole** (or similar) **Quantity: 2**	 Available from: https://www.nhbs.com/1b-schwegler-nest-box
	Installation instructions: • Bird boxes would be attached to building or sufficiently wide tree trunk or pole, so that it doesn't swing or rotate excessively in the wind; • At a height between 1.5-3 m; • On east, southeast, or northeast facing aspect; and • With a clear flight path in front of the box. **Further information:** • These 26 mm hole nest boxes are suitable for blue tit, marsh tit, coal tit and crested tit, and possibly wren. All other species are prevented from using the nest box due to the smaller entrance hole.

Type	Specification
Schwegler 3S Starling Box (or similar) **Quantity: 2**	 Available from: https://www.nhbs.com/3s-schwegler-starling-nest-box
	Installation instructions: • Bird boxes would be attached to building or sufficiently wide tree trunk or pole, so that it doesn't swing or rotate excessively in the wind; • At a height between 1.5-3 m; • On east, southeast, or northeast facing aspect; and • With a clear flight path in front of the box. **Further information:** • The large 45 mm hole of this box would not only attract starlings, it is also likely to provide overnight shelter for great spotted and lesser spotted woodpeckers. When there are fewer starlings, other species such as pied flycatchers and nuthatches may breed in these boxes.
Schwegler 1N Deep Nest Box (or similar) **Quantity: 2**	 Available from: https://www.nhbs.com/1n-schwegler-deep-nest-box
	Installation instructions: • This type of box should be positioned at a height between 1-1.5 m, preferably in a shaded area; • Attached to sufficiently wide tree trunk or pole so that it doesn't swing or rotate excessively in the wind; • On east, southeast, or northeast facing aspect; and • With a clear flight path in front of the box. **Further information:** • The wooden insert gives protection against predators because nesting takes place at the far end of the box. It is particularly effective against cats, martens, magpies and jays and therefore makes an effective contribution to breeding success;

Type	Specification
	• This type of box is particularly attractive to robins but can also be used by all types of tits, tree and house sparrows, redstarts and black redstarts, spotted flycatchers, pied wagtail, robins and wrens.

4.4.4.3 Significance of residual effects

Overall, the effect of the proposals on tree and scrub nesting species, including barn owl is predicted to be positive at a local level. Although a minor negative impact on habitat availability for ground nesting bird species could occur, albeit the Site only has potential to support low numbers of ground nesting species, the provision of longer grassland within the Site has scope to support these species, including skylark, either by offering foraging habitat or nesting habitat. No contravention of wildlife legislation is predicted. Overall, the impact upon breeding and foraging birds in general, is likely to be positive.

4.4.5 Hazel Dormouse

4.4.5.1 Potential impacts

Temporary loss and height reduction of a section of hedgerow along the eastern boundary of the Site to create visibility splay for Site access could result in temporary or permanent loss of suitable habitat and habitat connections for dormouse (if present).

4.4.5.2 Proposed mitigation measures

Dormouse presence/ absence surveys are being undertaken, and the results will be supplied as Supplementary Ecological Information. If hazel dormouse is found in surveys, precautionary working methods would be applied to the development and an appropriate protected species licence would be obtained, if necessary.

New hedgerow would be planted which would follow a similar route to that which is lost, so habitat loss would not be permanent.

4.4.5.3 Significance of residual effects

No contravention of wildlife legislation is predicted. The effect of the proposals on hazel dormouse is predicted to be no net change, or positive, overall, as appreciably more habitat is due to be created than is being lost or modified.

4.4.6 Bats

4.4.6.1 Potential impacts

Loss of linear features such as hedgerows can break commuting lines and therefore restrict access to suitable foraging habitat.

Lighting can interrupt the natural behaviour of bats and prevent them from using the affected area for foraging and commuting.

4.4.6.2 Proposed mitigation and enhancement measures

Trees with bat roosting potential on Site, predominantly located along the River Frome, would be retained. Linear features, comprising of tree belts, and watercourses, would remain unaffected to retain likely existing commuting and foraging flight lines for bats. Most hedgerow would be unaffected with the exception of modifications to approximately 25 m of

hedgerow H2, involving a widening of the existing access route gap of c.4 m to c.8 m and reducing the height of the remaining affected hedgerow section to 0.6 m.

Additional hedgerow alongside ditch D2, as well as trees and scrub across the Site, would be planted, enhancing foraging and commuting habitat availability. To encourage a diversity and increased biomass of invertebrate food availability, tussocky grassland areas would be sown outside the solar farm perimeter fences, and the area within the perimeter fencing would be sown with wildflower grassland. Furthermore, no pesticides would be used on Site as these can harm wildlife.

No unfiltered continuous artificial lighting would be used within the Site.

Roosting features would be provided, in the form of 10 bat boxes, to be installed on suitable trees adjacent to the River Frome. The boxes would comprise a range of different designs to provide a variety of roosting opportunities for both crevice and cavity dwelling bats. The proposed box design specification and installation instructions are provided in Table 4-2, and include boxes suitable for summer roosts as well as those suitable for maternity roosts and hibernation roosts during mild winters.

Table 4-2: Bat box specification and installation instructions

Type	Specification
Schwegler 2FN Bat Box (or similar) **Quantity: 3**	 Available from: https://www.nhbs.com/2fn-schwegler-bat-box
	Installation instructions: • Bat boxes would be installed on trees at a height between 4-6 m, facing south, southeast or southwest; • With a clear flight path in front of the box. **Further information:** • This box has a slope and opening at base, meaning cleaning is not required; • Contains two entrances and cavity roosting space with a domed roof; and • When mounted on trees, these boxes are suitable for a range of both cavity and crevice roosting bat species, particularly noctule and Bechstein's (Myotis bechsteinii) bats.

Type	Specification
Schwegler 1FF Bat Box **Quantity: 2**	 Available from: https://www.nhbs.com/1ff-schwegler-bat-box-with-built-in-wooden-rear-panel
	Installation instructions: • Bat boxes would be installed on trees at a height between 4-6 m, facing south, southeast or southwest; and • With a clear flight path in front of the box. **Further information:** • The box is open at the base to allow droppings to fall out so that cleaning is not necessary; and • These boxes are idea for crevice dwelling bats such as noctule and pipistrelle and can be used both as a summer and nursery roost.
Vivara Pro Large Multi Chamber Bat Box (or similar) **Quantity: 3**	 Available from: https://www.nhbs.com/large-multi-chamber-woodstone-bat-box
	Further information and installation instructions: • Bat boxes would be installed on trees at a height between 4-6 m, facing south, southeast or southwest. **Further information:** • These boxes are multi-purpose and cab be used as a summer roost, maternity roost and hibernation roost during mild winters; and • Suitable for a range of species including all three pipistrelle species, noctule, Leisler's, brown long-eared, Natterer's and Daubenton's.

Type	Specification
Schwegler 2F Bat Box with Double Front Panel (or similar) **Quantity: 2**	 Available from: https://www.nhbs.com/2f-schwegler-bat-box-with-double-front-panel
	Installation instructions: • Bat boxes would be installed on trees at a height between 4-6 m, facing south, southeast or southwest; and • With a clear flight path in front of the box. **Further information:** • Wooden panel insert discourages birds from nesting and provides an ideal space for crevice dwelling bats including all three pipistrelle species and Daubenton's bats.

4.4.6.3 Significance of residual effects

Together, the creation of more natural habitats, including suitable invertebrate overwintering tussocky grassland habitat, is predicted to increase the availability of invertebrate prey for bats using the Site to commute and forage.

Overall, the effect on bats as a result of the proposed scheme is predicted to be positive at a local level.

4.4.7 Otter and water vole

4.4.7.1 Potential impacts

For water vole, and by extension, otter, ditches within the Site were assessed as being unsuitable due to shallow water levels and bank faces which are managed to be steep and unvegetated.

Otter has been evidenced to make use of the riparian zone of the River Frome. Encroachment of development within this riparian zone could potentially affect otter habitat and contravene wildlife legislation.

4.4.7.2 Proposed mitigation measures

Water vole, should they occur within the ditches on-Site, would be protected by the implementation of good practice pollution prevention measures and the implementation of a 5 m buffer from the ditches.

Considering otter - the woodland, scattered trees and tall grasslands present within the riparian zone of the River Frome would be retained and unimpacted by the development, and a 10 m buffer from the river channel would be protected and areas of modified grassland would be enhanced through the creation of tussocky neutral grassland. Furthermore,

creation of areas of tall grassland within the core of the Site would provide additional terrestrial habitat, providing shelter and resting areas. There would be no increased human pressures post-development and embedded mitigation, detailed in Section 4.1, would protect water quality from run-off pollution. Perimeter fencing surrounding the solar farm would be fitted with open mammal gates or gaps would be provided underneath the fencing, to permit unrestricted access throughout the solar farm for mammals including otter (see Section 4.4.8).

Where bridge modifications are required, to an existing bridge over the unnamed tributary of the River Frome, these modifications would be preceded by a search for any field signs or burrows of water or otter within the area due to be affected by the works.

4.4.7.3 Significance of residual effects

No contravention of wildlife legislation is predicted. The effect of the proposals on water vole is predicted to be no net change. For otter, the effect is predicted to be positive at local level, due to improved riparian conditions on the bank top of the River Frome, where it borders the Site.

4.4.8 Other mammals - badger, brown hare, hedgehog and polecat

4.4.8.1 Potential impacts

Installation of fencing could restrict ability to cross the Site and reach suitable habitats, and prevent access to habitats within the Site such as hedgerows grassland and ditches.

4.4.8.2 Proposed mitigation and enhancement measures

[redacted]

All perimeter fencing surrounding the solar farm would be fitted with open mammal gates of a minimum size of 35 cm high by 30 cm wide (refer to Plate 15), spaced no greater than 20 m apart, or gaps would be provided underneath the fencing to permit unrestricted access throughout the solar farm for mammals including [redacted], hedgehog, brown hare, and polecat.

Areas underneath and around the solar panels would be sown with wildflower grassland in the south field and a tussocky wildflower grassland would be sown outside of perimeter fencing (refer to Section 4.3.3.1 Grassland). No pesticides would be used within the solar farm, to encourage a diversity and biomass of invertebrates. The improved diversity of vegetation and resulting predicted increase in invertebrate abundance and diversity would provide an improved foraging habitat for [redacted], brown hare and hedgehog. The proposed tall grassland areas would additionally provide optimal shelter and resting areas for brown hare and polecat within the Site.

Plate 15: Example of an open mammal gate in the perimeter fencing of a solar farm

4.4.8.3 Significance of residual effects

Overall, the effect of the proposals on [redacted]r, hedgehog, brown hare, and polecat is predicted to be positive at a local level.

4.5 Biodiversity Net Gain

The Statutory Biodiversity Metric[18] was used to calculate the existing baseline score for the Site and the post-development score of the scheme, considering the relevant biodiversity enhancements proposed.

The full results and copy of the Metric are provided in Appendix G (supplied separately). In summary, the Site was assessed as having a baseline value of 63.69 habitat area units, 4.47 hedgerow units, and 17.15 watercourse units.

Post-development, and taking into account all of the biodiversity enhancements described within this report and summarised in the Landscape Strategy Plan (Appendix B), the Site is predicted to have a value of 92.71 habitat units, 5.53 hedgerow units and 19.74 watercourse units.

This provides a significant 45.58% net increase in habitat units, a 23.64% net increase in hedgerow units and 15.11% increase in watercourse units.

A summary of the proposed newly created or enhanced habitat features, and their predicted condition, is provided in Table 4-3 and Table 4-4.

Table 4-3: Proposed new habitat creation (excludes retained features)

Proposed new habitat features	BNG habitat type	Extent	Predicted condition	Predicted failing criteria
Area habitats (ha)				
Grazed grassland within security fencing (EM3)	Modified grassland	4.56	Poor	A, B
Tussocky grassland (EM10). With addition of scattered scrub within 10 m riparian zone of River Frome.	Other neutral grassland	6.38	Moderate	B, F
Scrub	Mixed scrub	0.82	Poor	B, D, E
Trees along boundaries	Rural tree	0.1506	Moderate	C, E
Linear habitats (km)				
Species-rich native hedgerow	Species-rich native hedgerow	0.158	Moderate	C2

Table 4-4: Proposed habitat enhancements (excludes retained features)

Habitat feature	BNG habitat type	Extent	Condition movement	Other changes
Linear habitats (km)				
River Frome	Other rivers and streams	0.6	Fairly Poor - Moderate	Reduction of bank encroachment

[18] Defra (2023) Statutory Biodiversity Metric tools and guides. Available at: https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides

Habitat feature	BNG habitat type	Extent	Condition movement	Other changes
Ditches	Ditches	1.911	Poor - Poor	Reduction of bank encroachment

5.0 Summary of Effects

The overall net impact of the scheme upon receptors of ecological importance is illustrated in Table 5-1, along with the proposed biodiversity enhancements, and the precautions that would be taken to ensure legal compliance with respect to legally protected species.

Table 5-1: Summary of effects and avoidance, mitigation, compensation and enhancement measures

Ecological Feature	Potential Impacts	Proposed Avoidance, Mitigation, Compensation and Enhancement Measures	Residual Effects
Designated sites: River Frome SWS, River Lugg SSSI, River Wye SSI and SAC	• Habitats and their associated flora and fauna damaged by construction activities e.g. water pollution adversely affecting water quality.	• Prevention of pollutant run-off into watercourses during and post-construction; • The bank top habitat of the sections of the rivers found within the Site would be enhanced to a more natural tall grassland habitat; • No artificial features (such as reinforcements) would be added to Frome River or it's tributary; • Cattle grazing removed from Site and exclusion of sheep grazing within riparian buffer; and • No use of pesticides or herbicides on Site.	No net change
Hedgerows	• Reduction in hedgerow habitat.	• Retention of hedgerow where possible; and • Planting of new species rich hedgerow along ditch D2.	Positive effect at local level
Rivers – Frome River and unnamed tributary	• Habitat damaged by construction activities e.g. water pollution adversely affecting water quality.	• Prevention of pollutant run-off into watercourses during and post-construction; • The bank top habitat of the sections of the rivers found within the Site would be enhanced to a more natural tall grassland habitat; • No artificial features (such as reinforcements) would be added to Frome River or it's tributary;	No net change or marginal improvement

Ecological Feature	Potential Impacts	Proposed Avoidance, Mitigation, Compensation and Enhancement Measures	Residual Effects
		• Cattle grazing removed from Site and exclusion of sheep grazing within riparian buffer; • No use of pesticides or herbicides on Site; and • INNS Himalayan balsam removed along the southern bank of the River Frome.	
Himalayan balsam (invasive non-native species)	• Reduction in biodiversity; and • Spread of invasive non-native species in the wild. • Displacement of native flora; • Reduced native biodiversity; • Compromised integrity of riverbanks; • Increased prevalence of this invasive species further downstream; and • Harm to wildlife through use of herbicidal chemicals.	• INNS Himalayan balsam removed along the southern bank of the River Frome; and • Works completed manually without use of herbicidal chemicals.	Positive effect at local level
Freshwater mussel	• Pollution/ run off during construction, into watercourses inhabited by freshwater mussel, causing reduction in water quality.	• Employment of best practice pollution and siltation control measures to prevent run off into watercourses.	No net change
Terrestrial invertebrates	• Loss of habitat; and • Poor grassland management causing harm to existing and future invertebrate communities.	• Good quality habitats retained (e.g. mature trees, tall grassland vegetation); • Tussocky and species rich grassland communities created, and vegetation structure varied;	Positive effect at local level

Ecological Feature	Potential Impacts	Proposed Avoidance, Mitigation, Compensation and Enhancement Measures	Residual Effects
		• No more than 50% of wildflower management areas mown in a year, providing consistent refugia availability; and • No use of chemical herbicides or other pesticides on Site.	
Great crested newt	• Originally proposed southern access route causing disturbance and adversely modifying terrestrial habitat near pond used by great crested newt.	• Site access point would be via east boundary instead of from the south; • Converting nearby arable land to neutral grassland would improve and increase area of suitable terrestrial habitat; and • Grassland would have minimal management, with rotational cutting of no more than 50% of wildflower grassland area per year, providing consistent refugia availability.	Positive effect at local level. No contravention of wildlife legislation
Breeding birds	• Potential damage/ destruction of active nests during Site clearance works; • Reduction in nesting habitat.	• Avoidance of vegetation clearance during bird nesting season (March-August), or if clearance required during nesting season, this would commence following a check for nesting birds by a suitably qualified ecologist. If nests are found these would be protected by an exclusion buffer zone until young have fledged; • Provision of additional nesting opportunities in the form of bird boxes including boxes targeting local priority species such as barn owl; • New hedgerow, tree, and scrub planting including berry and nut rich species.	Positive effect at local Level for tree and shrub nesting species, including barn owl Potential minor negative impact on ground nesting bird species though long grassland areas would be created Overall positive impact upon

Ecological Feature	Potential Impacts	Proposed Avoidance, Mitigation, Compensation and Enhancement Measures	Residual Effects
			breeding birds in general. No contravention of wildlife law
Hazel dormouse	• Temporary or permanent loss of suitable habitat and habitat connections for dormouse (if present).	• Precautionary working methods applied to the development; • Appropriate protected species licence obtained, if necessary; and • New hedgerow would be planted which follows a similar route to that which is lost, so habitat and connectivity loss not permanent. Overall gain in hedgerow length and species richness, combined with tree planting, leading to an increase in suitable dormouse habitat.	No net change or net positive impact due to gain in suitable habitat. No contravention of wildlife law
Bats	• Reduction in foraging and commuting habitat directly through removal of habitat or indirectly through increased lighting; and • Reduction of roosting opportunities through removal of mature trees.	• Retention of all trees with suitability for roosting bats; • Provision of additional roosting opportunities in the form of bat boxes; • No unfiltered continuous lighting to be used within the Site; and • Provision and improvement of foraging habitat, including seeding of day and night flowering plants to encourage invertebrate diversity and increase their abundance as a foraging resource	Positive effect at local level
Otter	• Encroachment of development within riparian zone of River Frome could	• Suitable terrestrial habitat within riparian zone of River Frome would be retained;	Positive effect at local level

Ecological Feature	Potential Impacts	Proposed Avoidance, Mitigation, Compensation and Enhancement Measures	Residual Effects
	affect otter habitat and contravene wildlife legislation	• A 10 m buffer from the river channel would be protected and areas of modified grassland would be enhanced through the creation of tussocky neutral grassland; • Creation of areas of tall grassland across the Site providing additional suitable habitat; and • Installation of mammal gates or fencing gaps to allow access throughout the Site.	No contravention of wildlife law
Water vole	• Little potential impact due to little of suitable habitat within main body of the site; ditches are shallow and have unvegetated bank faces;	• Prevention of pollutant run-off into watercourses during and post-construction; • Pre-commencement checks of affected areas prior to bridge reinforcement works on unnamed tributary; and • Implementation of a 5 m buffer from ditches	Positive effect at local level No contravention of wildlife law
Badger	• [redacted]	• [redacted]	[redacted]
Other mammals – brown hare, hedgehog and polecat	• Installation of fencing could restrict ability to cross the Site and reach suitable habitats, and prevent access to habitats within the Site such as hedgerows grassland and ditches.	• Installation of mammal gates or fencing gaps to allow access throughout the Site; • Provision of suitable wildflower rich grassland foraging habitat.	Positive effect at local level

Ecological Feature	Potential Impacts	Proposed Avoidance, Mitigation, Compensation and Enhancement Measures	Residual Effects
Statutory biodiversity net gain	• Loss in biodiversity units	• Provision of appropriate habitat (area), hedgerow (linear) and watercourse (linear) enhancements, to achieve >10% biodiversity net gain.	+45.58% net gain in habitat units +26.64% net gain in hedgerow units +15.11% net gain in watercourse units

Drawing 1 UK Habitat Survey

Ecological Impact Assessment

Frome Valley Solar Farm

Anesco Limited

SLR Project No.: 424.065134.00001 v2

10 June 2024

359200 359400 359600 359800 360000

241800 241600 241400

Secondary Codes:
10 - Scattered Scrub
32 - Scattered Trees
47 - Freshwater - Natural
50 - Ditch
101 - Cattle Grazed
128 - Tall or Tussocky Sward
504 - Waterlogged
510 - Bare Ground
851 - Culvert

N

LEGEND

- Site Boundary
- Target Note
- Individual Tree (200)
- Individual Tree (203)

Primary Habitat Classification

Heathland and Shrub - Hedgerows
- h2 - Hedgerow
- h2a - Hedgerow Priority Habitat

Rivers and Lakes - Standing Open Water and Canals
- r1 - Standing Open Water and Canals

Rivers and Lakes - Rivers and Streams
- r2a - Rivers (Priority Habitat)

Cropland - Arable and Horticulture
- c1b5 - Rye-grass and Clover Ley
- c1d8 - Other Non-cereal Crops

Grassland - Neutral Grassland
- g3 - Neutral Grassland

Grassland - Modified Grassland
- g4 - Modified Grassland

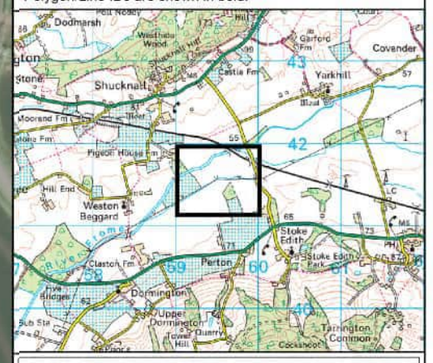
Heathland and Shrub - Dense Scrub
- h3d - Bramble Scrub
- h3f - Hawthorn Scrub

Rivers and Lakes - Rivers and Streams
- r2b - Other Rivers and Streams

Urban - Built-up Areas and Gardens
- u1c - Artificial Unvegetated, Unsealed Surface

Woodland and Forest - Broadleaved Mixed and Yew Woodland
- w1g - Other Woodland; Broadleaved

Note:
Polygon/Line IDs are shown in bold.



Anesco

SLR

FROME VALLEY SOLAR FARM
ECOLOGICAL IMPACT ASSESSMENT
UK HABITAT BASELINE

FIGURE 1

Scale 1:3,000 @ A3
Date APRIL 2024

0 125 250
Metres

424.065134.00001.0002.0 UK Habitat Baseline

Appendix A Proposed Site Layout

Ecological Impact Assessment

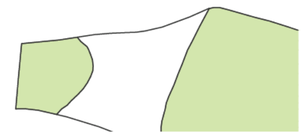
Frome Valley Solar Farm

Anesco Limited

SLR Project No.: 424.065134.00001 v2

10 June 2024

PROJECT NAME: FROME VALLEY	
GRID REFERENCE :	SO 59494 41469
SITE AREA:	73.89 Acres / 29.90 ha
MODULE TILT:	15°
AZIMUTH:(NORTH EASTERN FIELDS)	20°
PITCH:	11.34m
ROW TO ROW DISTANCE:	4.5m
NO. OF STRINGS:	1174
MODULE (MAKE AND MODEL):	JA SOLAR, JAM66D45 605/LB
MODULE POWER:	605W
MODULE DIMENSIONS:	2384mm X 1134mm
NUMBER OF MODULES:	34046
INVERTER (MAKE AND MODEL):	SUNGROW SG350HX
INVERTER POWER:	352kW
NUMBER OF INVERTERS:	46
2.5MVA TRANSFORMER:	05
2.0MVA TRANSFORMER:	02
1.5MVA TRANSFORMER:	01
NUMBER OF TRANSFORMERS:	08
TOTAL INSTALLED CAPACITY:	20.60MWp
MAX INVERTER AC POWER:	16.192MW



Key	
	Site Boundary
	LV Cable Route
	Security Fence
	Gate within Security Fence
	Access Track
KV KV	Overhead Electrical Cables
	Utilities Easement
	Feeder Pillar & Transformer
	Hardstanding area
	Access Crossing (To be maintained)
	66kV Substation & DNO Control Room
	Customer Substation
	PV Array - JA Solar, 605W Modules

Installer Details

Anesco Ltd.
The Green,
Easter Park,
Benyon Road,
Reading,
RG7 2PQ
Tel: 0845 894 4444

Comments

Not for Construction

0 10 20 40 60 80 100

Revision	Description	Revised By	Date	Drawn By
A	Issued for comment	MS	25/03/2024	MS
B	Site Updated	JH	24/04/2024	
C	DNO Substation relocated	JH	02/05/2024	
D	RLB amended and addition access included	MS	09/05/2024	
E	Two North Eastern Fields amended to have an azimuth of 20°	MS	13/05/2024	
F	DNO and Customer Substation moved	MS	17/05/2024	

Scale: 1:2500@ A2

Sheet Size: A2

Installation Address

Land At Stoke Edith,
Herefordshire,
HR1 4HG

Project: Frome Valley

Title: Site Layout

Drawing No.: C0002470_02

Rev.: F

Anesco™ AMAZING ENERGY

Appendix B Landscape Strategy Plan

Ecological Impact Assessment

Frome Valley Solar Farm

Anesco Limited

SLR Project No.: 424.065134.00001 v2

10 June 2024

The scaling of this drawing cannot be assured

Revision		Date	Drn	Ckd
A	Update Site Boundary and Layout	29.05.24	SC	AC

LEGEND

- Site Boundary
- Existing Water Courses and Features ^
- Contours/Spot Heights (Metres AOD) ^
- Existing Trees and Woodland
- Existing Hedgerows
- Existing Grassland to be retained for Grazing
- Proposed Trees and Tree Belts
- Proposed Hedgerows
- Proposed Wildflower Grassland
- Proposed Native Scrubs
- Proposed Photovoltaic Layout
- Proposed Fencing
- Proposed Access Route
- Proposed Customer Substation

Sources:
^ OS Mapping
© Aerial Photograph - Bing Map dated:15/08/2023

Data collated for constraints and analysis mapping is based on publicly available sources at the time of preparation inserted using the British National Grid and may itself not be accurate. Stantec shall not be liable for the accuracy of data derived from external sources.

Project
Frome Valley Solar, Hereford

Drawing Title
Landscape Strategy Plan

Date	Scale	Drawn by	Check by
15.05.2024	1:5000 @A3	AC	MF

Project No	Drawing No	Revision
333101014	LN-LP-07	A

0 50 100 150 200 250m

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- A3

Appendix C Relevant Legislation and Policy

Ecological Impact Assessment

Frome Valley Solar Farm

Anesco Limited

SLR Project No.: 424.065134.00001 v2

1010 June 2024

C.1 Relevant Legislation

A summary of legislation relevant to (onshore) biodiversity in England and Wales is provided below. Note that the summary provided here is intended for general guidance only and the original legislation should be consulted for definitive information.

C.1.1 Environment Act 2021

The Environment Act has wide ranging provisions including those around:

- Environmental governance;
- Environmental regulation;
- Waste and resource efficiency;
- Air quality and environmental recall;
- Water;
- Nature and biodiversity; and
- Conservation covenants.

Of particular relevance is Part 6 of the Act which introduces “biodiversity gain in planning” and will apply in England to planning applications under the Town & Countryside Act and the Planning Act. Schedule 14 now requires that biodiversity gain be a condition of planning permission in England. These changes will be enacted through subsequent secondary legislation or regulations. This part of the Act also changes the responsibilities that Government or public bodies have by strengthening the existing NERC Act biodiversity duty. Public authorities are now required to seek to conserve and enhance biodiversity in the exercise of their functions.

C.1.2 Coservation of Habitats and Species Regulations 2017 (as amended)

The Conservation of Habitats and Species Regulations 2017 (as amended) (the Habitats Regulations) consolidate the Conservation of Habitats and Species Regulations 2010 with subsequent amendments. The Regulations transpose Council Directive 92/43/EEC, on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive), into national law. Under the Habitats Regulations it is an offence to deliberately capture, kill or disturb[19] wild animals listed under Schedule 2 of the Regulations as well as damage or destroy a breeding site or resting place of such an animal (even if the animal is not present at the time). European Sites, including Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), are also protected under the Habitat Regulations, and any proposal that could affect them will require a Habitats Regulations Assessment (HRA).

C.1.3 Natural Environment and Rural Communites Act 2006

Section 40 of the NERC Act 2006 places a duty on public authorities to have regard to the purpose of conserving biodiversity in the exercise of their functions. Public authorities include government departments, local authorities and statutory undertakers.

[19] Disturbance, as defined by the Conservation of Habitats and Species Regulations 2010, includes in particular, any action which impairs the ability of animals to survive, breed, rear their young, hibernate or migrate (where relevant); or which significantly affects the local distribution or abundance of the species.

Section 41 of the Act (Section 42 in Wales) requires the publication of a list of habitats and species publish which are of principal importance for the purpose of conserving biodiversity. The Section 41 list is used to guide authorities in implementing their duty to have regard to the conservation of biodiversity.

C.1.4 Protection of Badgers Act 1992

The Protection of Badgers Act 1992 makes it illegal to kill, injure or take a badger or to intentionally or recklessly interfere with a badger sett. Sett interference includes disturbing badgers whilst they are occupying a sett or obstructing access to it.

C.1.5 Wildlife and Countryside Act 1981

The Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way (CRoW) Act 2000 and the Natural Environment and Rural Communities (NERC) Act 2006, consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive), making it an offence to:

- Intentionally kill, injure or take any wild bird or their eggs or nests (with certain exceptions) and disturb any bird species listed under Schedule 1 to the Act, or its dependent young while it is nesting;
- Intentionally kill, injure or take any wild animal listed under Schedule 5 to the Act;
- intentionally or recklessly damage, destroy or obstruct any place used for shelter or protection by any wild animal listed under Schedule 5 to the Act;
- intentionally or recklessly disturb certain Schedule 5 animal species while they occupy a place used for shelter or protection;
- Pick or uproot any wild plant listed under Schedule 8 of the Act; or
- Plant or cause to grow in the wild any plant species listed under Schedule 9 of the Act.

C.2 Relevant Planning Policy

A summary of national planning policy relevant to (onshore) biodiversity in England and Wales is provided below. Note that the summary provided here is intended for general guidance only and the original policy documents should be consulted for definitive information. For local planning policy relevant to biodiversity the relevant local plans should be consulted.

The National Planning Policy Framework (NPPF, 2023)[20] sets out guidance for local planning authorities and decision-makers on how to apply planning policies when drawing up plans and making decisions about planning applications. Along with Government Circular 06/05[21], the broad policy objectives in relation to the protection of biodiversity and geological conservation in England through the planning system are set out.

Paragraph 180 d of the NPPF states that:

[20] Department for Levelling Up, Housing & Communities (December 2023) *National Planning Policy Framework*.

[21] Office of the Deputy Prime Minister. 2005. Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System. ODPM Circular 06/2005.

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures."*

Furthermore, Paragraph 181 states that plans should:

"*...take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries".*

Paragraph 185 states that:

"To protect and enhance biodiversity and geodiversity, plans should:

a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and

b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity."

Paragraph 186 goes on to state:

"When determining planning applications, local planning authorities should apply the following principles:

a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

b) development on land within or outside a Site of Special Scientific Interest, 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 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 Sites of Special Scientific Interest;

c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and

d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate."

Appendix D Desk Study Data

Ecological Impact Assessment

Frome Valley Solar Farm

Anesco Limited

SLR Project No.: 424.065134.00001 v2

10 June 2024

Herefordshire Biological Records Centre

Supporting wildlife recorders and recording groups in Herefordshire

Herefordshire Archive and Records Centre | Fir Tree Lane | Rotherwas | Hereford | HR2 6LA
(01432) 261538 | hbrc@herefordshire.gov.uk | hbrc.org.uk

Aaron Bailey
SLR Consulting Ltd
Unit 2, Newton Business Centre
Thorncliffe Park Estate
Newton Chambers Road
Chapeltown
Sheffield
S35 2PH

11th April 2024

Our reference: 4513
Your reference: 424.065134.00001

Dear Aaron,

FROME VALLEY SOLAR FARM – SO5944541569

SPECIES RECORDS

Further to your request, I have conducted a search of the database for the area you identified. These records are attached.

Grid references containing a combination of letters and numbers, for example 'SO54E' are formulated according to the **DINTY** system. Such records are often from botanical recording, whereby a 10km square is divided into twenty-five equal 2km x 2km squares, each alpha-coded, thus:

E	J	P	U	Z
D	I	N	T	Y
C	H	M	S	X
B	G	L	R	W
A	F	K	Q	V

Therefore the correct full grid references for SO54E are as follows: SO5048, SO5049, SO5148 and SO5149 i.e. four 1km squares.

Please keep location details of any bat, badger or newt records confidential.

DESIGNATED SITES

In addition, I have produced a map indicating designated sites and have provided register details for the relevant sites:

A Perton Roadside Section and Quarry Site of Special Scientific Interest (SSSI)
The citation details are attached.

B Dormington Slip, Dormington Local Geological Site
Please contact Moira Jenkins at Herefordshire and Worcestershire Earth Heritage Trust for further information: m.jenkins@worc.ac.uk.

C Shucknall Hill, Westhide Local Geological Site
Please contact Moira Jenkins at Herefordshire and Worcestershire Earth Heritage Trust for further information: m.jenkins@worc.ac.uk.

D Yarkhill 1 Local Geological Site
Please contact Moira Jenkins at Herefordshire and Worcestershire Earth Heritage Trust for further information: m.jenkins@worc.ac.uk.

SO53/24 Backbury Hill SWS
The register states: "Backbury Hill, Broomy Green, Broad Grove, Fern Hope, Prior's Court and Frith Woods.
An area of assorted woodlands and scrub-invaded grassland.
Areas of conifer and ancient semi-natural woodland are intermingled. Amongst the species are yew, wayfaring tree and coppiced oak. The ground flora is very good and includes meadow saxifrage, wild daffodil and primrose."
Date 1990

SO53/30 Perton Roadside Section and Quarry SWS
The register states: "A site which has yielded some interesting fossils."
Date 1990

SO54/09 Woodland on Shucknall Hill SWS
The register states: "Westhide Wood. Withington and Staples Hole Coppices. Hillend Grove. Rough Plantation.
An ancient woodland with some larch and sweet chestnut. Oak is the dominant tree, with hazel coppice.
The ground flora includes deadly nightshade and wild daffodil.
The track up to the wood from 589427 has a rich limestone flora."
Date 1990

SO63/05 Woodland along Seager Hill SWS
The register states: "Dormington, Priors and Cosington Woods. The Plantation. Little Hill. Middle Park. The Nighbrooks. Park Coppice.
The major part of this woodland is ancient and some of it is still semi-natural.
Oak is dominant and there are some fine old yew trees. The ground flora is excellent and includes bluebell and abundant wild daffodils.
Little Hill is an important site for the study of the geology of Wenlock limestone and also supports a colony of pearl-bordered fritillary."
Date 1990

SO65/10 River Frome SWS
The register states: "A steep-sided stream, with a thick wooded margin of alder, with hazel, cherry and pollarded willow.
Freshwater mussels are present and kingfishers are frequently seen."
Date 1990

HABITAT INFORMATION

Finally, please find attached a map showing BAP Priority Habitats within your search area. Please be aware that where Natural England National Inventory BAP Priority Habitats data and HBRC BAP Priority Habitats data overlap in the BAP habitats map that you have been sent HBRC data has been supplied. This is because HBRC data is considered to be more reliable.

Please get in touch if you have any queries. I can confirm that the charge for the retrieval and analysis of your requests is £210 exclusive of VAT. You will receive an invoice from Herefordshire Council shortly: the Council handle all financial accounting on behalf of HBRC.

I hope that this information proves to be useful. I look forward to receiving new findings and biological records which any survey you undertake yields: this will help us to improve the information available for natural heritage conservation, research, advice, education and public information.

Yours sincerely,

Jane Tavener
Biological Data Officer
Encs.

Herefordshire Biological Records Centre

Supporting wildlife recorders and recording groups in Herefordshire

TERMS AND CONDITIONS FOR THE SUPPLY OF DATA

1. Copyright of all records remains with the recorder, and of the collated data with Herefordshire Biological Records Centre.

2. No copies of data are to be made for use by third parties, without written permission from Herefordshire Biological Records Centre.

3. Permission must be obtained in writing from Herefordshire Biological Records Centre if the data supplied is to be used for any other purpose than that described on the Data Request Form.

4. Data are provided subject to ongoing approval for use from individual recorders, local recording groups or national recording schemes. Should such providers of data withdraw permissions for use of these data, the requestor may be obliged to remove relevant data from records.

5. The data must not be entered onto a computerised database or GIS without permission from Herefordshire Biological Records Centre.

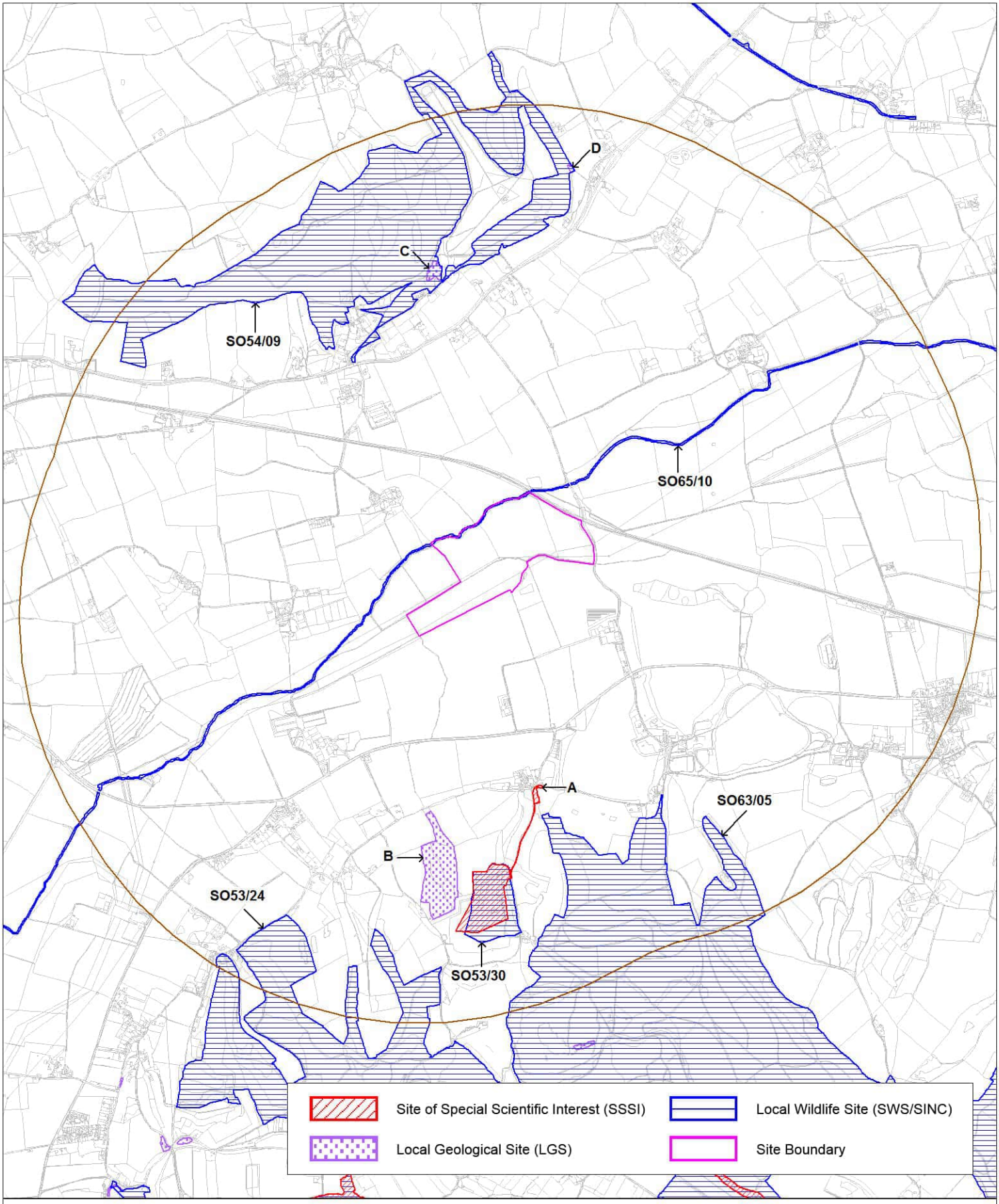
6. Herefordshire Biological Records Centre shall be acknowledged in any report relating to data supplied, and we would appreciate any details of biological records resulting from any survey undertaken.

7. Permission to use data expires 12 months after its supply. Applications to extend beyond this period should be made before the expiry date.

8. Data are as held by Herefordshire Biological Records Centre. Past records of presence of a species or habitat do not guarantee continued occurrence. Absence of records does not imply absence of a species, merely that no records are held.

9. Data are provided *without prejudice* and according to our Charging Policy, which is available on request. Commercial users are always subject to our Charging policy. Further to your request we will provide you with a quotation for processing of information and/or biological records; if this quotation is acceptable we will require approval in writing via letter or fax in order to proceed. Voluntary recording societies and local naturalists are generally exempted from this Policy.

Present Charge Rates are based on £120 for the first hour of work and £90 per additional hour, exclusive of VAT.



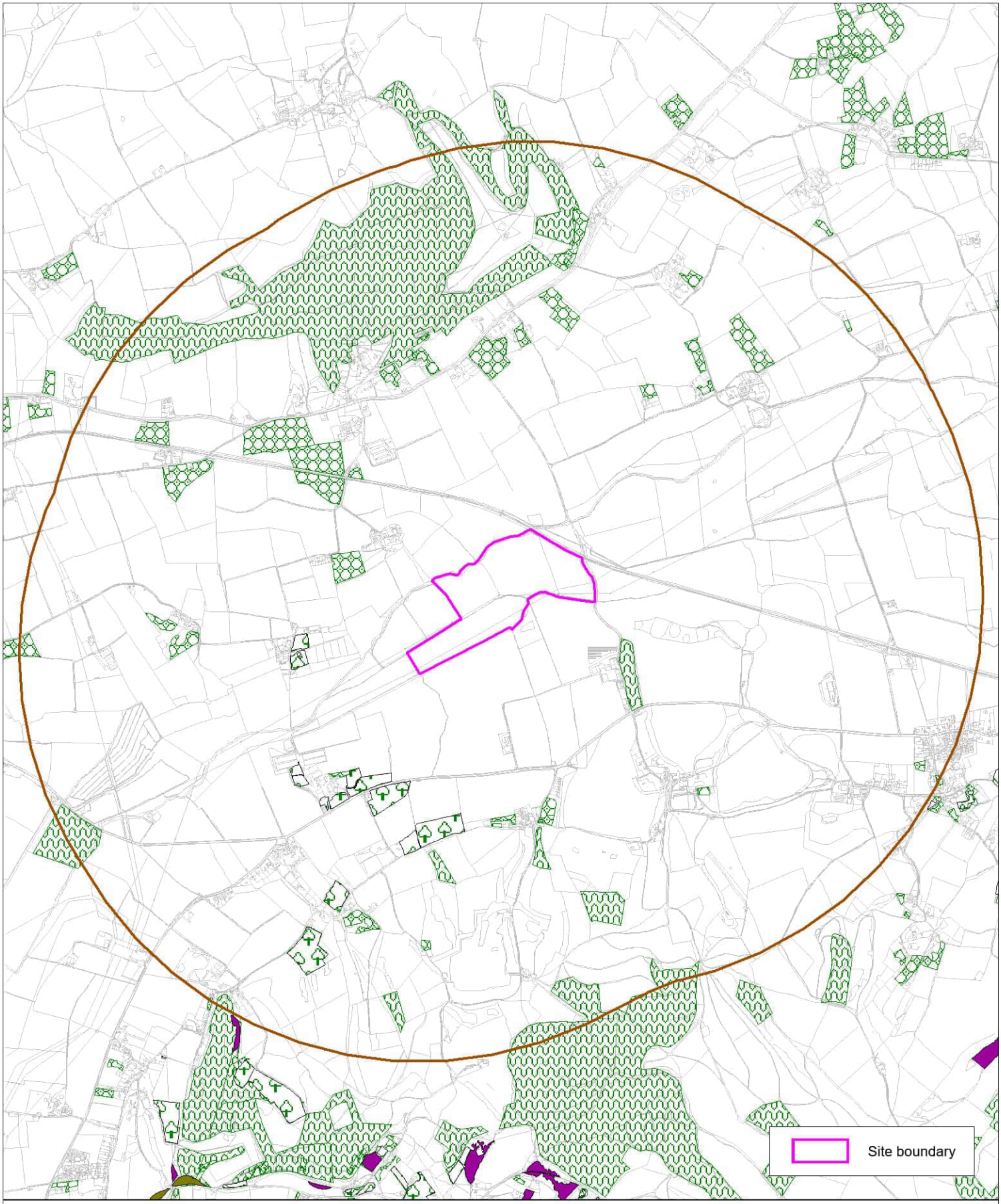
Map showing designated sites within
2km of site boundary at SO5944541569
Frome Valley Solar Farm

NORTH

SCALE 1:26,000

Herefordshire Archive and Records Centre
Fir Tree Lane
Rotherwas
Hereford
HR2 6LA

Telephone: (01432) 261538
Email: hbrc@herefordshire.gov.uk



Map showing BAP Priority habitats within 2km of site boundary at SO5944541569 Frome Valley Solar Farm

NORTH

SCALE 1:26,000

Herefordshire Archive and Records Centre
Fir Tree Lane
Rotherwas
Hereford
HR2 6LA

Telephone: (01432) 261538
Email: hbrc@herefordshire.gov.uk

Appendix E Habitat Suitability Index (HSI) Calculations

Ecological Impact Assessment

Frome Valley Solar Farm

Anesco Limited

SLR Project No.: 424.065134.00001 v2

10 June 2024

E.1 Habitat Suitability Index (HSI) Calculations

Table E-1: Habitat Suitability Index Assessments of Ponds

Pond	Habitat Suitability Index Parameter Score										HSI Score
	SI1	SI2	SI3	SI4	SI5	SI6	SI7	SI8	SI9	SI10	
P1	1	-	0.9	0.33	0.6	0.67	0.67	0.68	0.67	0.35	**0.65 (A)**
P2	1	0.98	1	0.67	0.6	0.67	0.67	0.64	0.67	0.5	**0.72 (G)**
P3	1	0.98	1	0.67	0.6	0.67	0.67	0.64	0.67	0.5	**0.76 (G)**

(E) Excellent, (G) Good, (A) Average, (BA) Below Average, (P) Poor; (SI) Suitability Index number.

Appendix F Great Crested Newt eDNA Results

Ecological Impact Assessment

Frome Valley Solar Farm

Anesco Limited

SLR Project No.: 424.065134.00001 v2

10 June 2024

Client: Gary Oliver,
SLR Consulting

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-3012	Condition on Receipt: Good	Volume: Passed
Client Identifier: Pond 2 Frome Valley, SO 596396 41488	Description: pond water samples in preservative	
Date of Receipt: 18/04/2024	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control†	2 of 2	Real Time PCR	22/04/2024
Degradation Control§	Within Limits	Real Time PCR	22/04/2024
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	22/04/2024
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)#	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:	[redacted]	Signed:	[redacted]
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	23/04/2024	Date of issue:	23/04/2024

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

† Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

§ No degradation is expected within time frame of kit preparation, sample collection and analysis.

#Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Client: Gary Oliver,
SLR Consulting

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-3014	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 3 Frome Valley, SO 59650 41417	Description: pond water samples in preservative	
Date of Receipt: 18/04/2024	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	22/04/2024
Degradation Control[§]	Within Limits	Real Time PCR	22/04/2024
Great Crested Newt*	3 of 12 (GCN positive)	Real Time PCR	22/04/2024
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:	[redacted]	Signed:	[redacted]
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	23/04/2024	Date of issue:	23/04/2024

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Client: Gary Oliver,
SLR Consulting

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-3025	Condition on Receipt: Good	Volume: Passed
Client Identifier: Pond 1 Frome Valley, SO 59692 41975	Description: pond water samples in preservative	
Date of Receipt: 18/04/2024	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	22/04/2024
Degradation Control[§]	Within Limits	Real Time PCR	22/04/2024
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	22/04/2024
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:	[redacted]	Signed:	[redacted]
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	23/04/2024	Date of issue:	23/04/2024

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Appendix 1: Interpretation of results

Sample Condition

Upon sample receipt we score your samples according to quality: good, low sediment, medium sediment, high sediment, white precipitate, and presence of algae.

There are three reasons as to why sediment should be avoided:

1. It is possible for DNA to persist within the sediment for longer than it would if it was floating in the water which could lead to a false positive result i.e. in this case GCN not recently present but present a long time ago
2. In some cases sediment can cause inhibition of the PCR analysis used to detect GCN eDNA within samples which could lead to an indeterminate result.
3. In some cases sediment can interfere with the DNA extraction procedure resulting in poor recovery of the eDNA which in turn can lead to an indeterminate result.

Algae can make the DNA extraction more difficult to perform so if it can be avoided then this is helpful.

Sometimes samples contain a white precipitate which we have found makes the recovery of eDNA very difficult. This precipitate can be present in such high amounts that it interferes with the eDNA extraction process meaning that we cannot recover the degradation control (nor most likely the eDNA itself) at sufficient levels for the control to be within the acceptable limits for the assay, therefore we have to classify these type of samples as indeterminate.

What do my results mean?

A positive result means that great crested newts are present in the water or have been present in the water in the recent past (eDNA degrades over around 7-21 days).

A negative result means that DNA from the great crested newt has not been detected in your sample.

On occasion an inconclusive result will be issued. This occurs where the DNA from the great crested newt has not been detected but the controls have indicated that either: the sample has been degraded and/or the eDNA was not fully extracted (poor recovery); or the PCR inhibited in some way. This may be due to the water chemistry or may be due to the presence of high levels of sediment in samples which can interfere with the DNA extraction process. A re-test could be performed but a fresh sample would need to be obtained. We have successfully performed re-tests on samples which have had high sediment content on the first collection and low sediment content (through improved sample collection) on the re-test. If water chemistry was the cause of the indeterminate then a re-test would most likely also return an inconclusive result.

The results will be recorded as indeterminate if the GCN result is negative and the degradation result is recorded as:

1. evidence of decay - meaning that the degradation control was outside of accepted limits
2. evidence of degradation or residual inhibition - meaning that the degradation control was outside of accepted limits but that this could have been due to inhibitors not being removed sufficiently by the dilution of inhibited samples (according to the technical advice note)

Appendix G Statutory Biodiversity Metric Calculations (Supplied Separately)

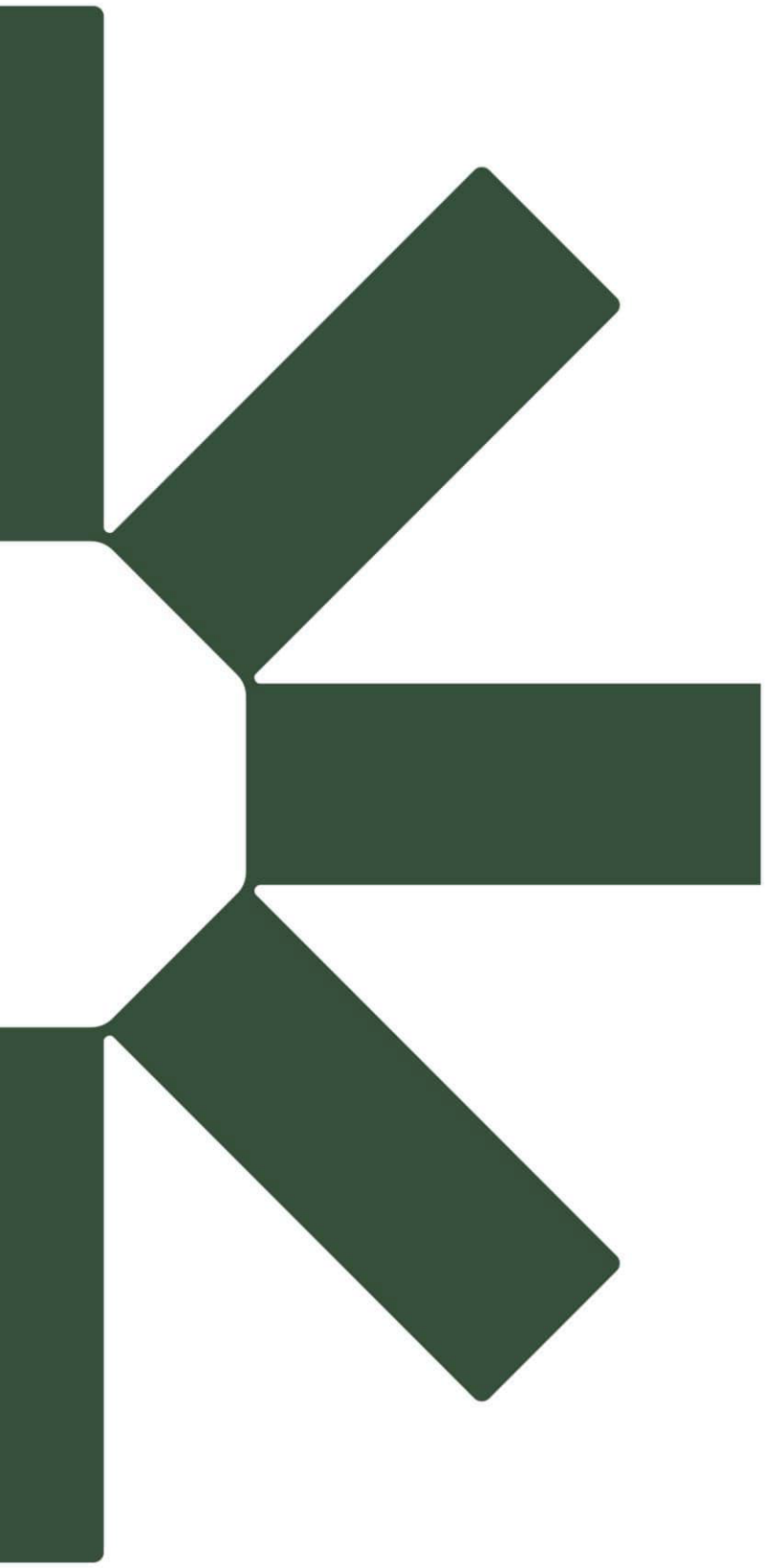
Ecological Impact Assessment

Frome Valley Solar Farm

Anesco Limited

SLR Project No.: 424.065134.00001 v2

10 June 2024



Making Sustainability Happen