7 Ecology

7.1 Introduction

7.1.1 This chapter of the Environmental Statement (ES) assesses the effects of the Proposed Development on the ecology of the Site. It has been written by Clarkson and Woods.

7.1.2 The chapter describes the methods used to assess the likely significant effects; the baseline conditions currently existing at the Site and surroundings; the potential direct and indirect effects of the Proposed Development arising from impacts on designated sites, sensitive habitats and species; the mitigation measures required to prevent, reduce, or offset the identified significant effects; and the likely the residual effects after these measures have been employed.

7.1.3 This chapter is supported by the following technical appendices:

- Appendix 7.1: Ecological Baseline Report and
- Appendix 7.2: Biodiversity Net Gain Assessment

7.2 Consultation

7.2.1 In preparing the Application, the Applicant undertook EIA Screening and Scoping with South Oxfordshire District Council (SODC) in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended).

7.2.2 In relation to biodiversity matters, the Countryside Officer for SODC advised in their scoping opinion that the following issues should be considered expressly within the ES chapter:

- Impacts of development on populations of farmland birds (e.g. skylark)
- Impacts of development on priority habitats (e.g. hedgerows, woodland)
- Impacts of development on ordinary watercourses (e.g. ditch network)

7.2.3 Natural England also responded to the scoping request setting out the key factors that the EIA should address in relation to designated sites, habitats and species. With reference to designated sites, part of Natural England's response stated the proposal is unlikely to adversely impact any European or internationally designated nature conservation sites or nationally designated sites.

7.3 Legislation, Policy Context and Guidance

Legislation

7.3.1 Key legislation relevant to biodiversity and nature conservation which has informed the assessment process includes:

- The Environment Act 2021;

- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 ('The Habitats Regulations');
- The Wildlife and Countryside Act 1981 (as amended);
- The Natural Environment and Rural Communities (NERC) Act 2006, specifically the 'Section 41 lists' of Species and Habitats of Principal Importance which are capable of being material consideration within the planning process;
- The Countryside Rights of Way Act 2000;
- The Protection of Badgers Act 1992; and
- The Hedgerows Regulations 1997.

National Planning Policy

7.3.2 Key national planning policy relevant to biodiversity and nature conservation which has informed the assessment process includes:

- The National Planning Policy Framework Section 15;
- Overarching National Policy Statement for Energy (EN-1) Sections 4.2, 4.5 and 5.4; and
- National Policy Statement for Renewable Energy Infrastructure (EN-3) Section 3.10.

Local Planning Policy

7.3.3 The following local planning policies are contained within the adopted South Oxfordshire Local Plan (2011 – 2035), and are particularly pertinent to this assessment:

Policy ENV2: Biodiversity - Designated Sites, Priority Habitats and Species

- 1. The highest level of protection will be given to sites of international nature conservation importance (Special Areas of Conservation). Development that is likely to result in a significant effect, either alone or in combination, on such sites will need to satisfy the requirements of the Conservation of Habitats and Species Regulations 2017 (as amended).
- 2. Sites of Special Scientific Interest (SSSI) are of national importance. Development that is likely to have an adverse effect on a SSSI (either on its own or in combination with other developments) will only be permitted in exceptional circumstances, where it can be demonstrated that the benefits of the development in the location proposed clearly outweigh any harm to the special interest features and the SSSI's contribution to the local ecological network. In such circumstances, measures should be provided (and secured through planning conditions or legal agreements) that would mitigate or, as a last resort, compensate for the adverse effects resulting from development.
- 3. Development likely to result, either directly or indirectly to the loss, deterioration or harm to:
    - • Local Wildlife Sites
    - • Local Nature Reserves

- • Priority Habitats and Species
- • Legally Protected Species
- • Local Geological Sites
- • Ecological Networks (Conservation Target Areas)
- • Important or ancient hedges or hedgerows
- • Ancient woodland and veteran trees

will only be permitted if: i) the need for, and benefits of the development in the proposed location outweigh the adverse effect on the interests; ii) it can be demonstrated that it could not reasonably be located on an alternative site that would result in less or no harm to the interests; and iii) measures will be provided (and secured through planning conditions or legal agreements), that would avoid, mitigate or as a last resort, compensate for the adverse effects resulting from development.

- 4. Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) will be refused planning permission, unless there are wholly exceptional reasons justifying the granting of planning permission.

5. Where development has the potential to affect a proposed wildlife site the developer must undertake surveys and assessments to determine whether the site meets the criteria for Local Wildlife Site status.

Policy ENV3: Biodiversity

- 1. Development that will conserve, restore and enhance biodiversity in the district will be supported. All development should provide a net gain in biodiversity where possible. As a minimum, there should be no net loss of biodiversity. All proposals should be supported by evidence to demonstrate a biodiversity net gain using a recognised biodiversity accounting metric.

- 2. Development proposals which would result in a net loss of biodiversity will only be considered if it can be demonstrated that alternatives which avoid impacts on biodiversity have been fully explored in accordance with the mitigation hierarchy*. In the absence of alternative sites or layouts, development proposals must include adequate mitigation measures to achieve a net gain of biodiversity. Where harm cannot be prevented or adequately mitigated, appropriate compensation measures will be sought, as a last resort, through planning conditions or planning obligations (depending on the circumstances of each application) to offset the loss by contributing to appropriate biodiversity projects to achieve an overall net gain for biodiversity.

- 3. Planning permission will only be granted if impacts on biodiversity can be avoided, mitigated or, as a last resort, compensated fully.

Policy ENV4: Watercourses

- 1. Development of land that contains or is adjacent to a watercourse must protect and where possible, enhance the function and setting of the watercourse and its biodiversity. As a last resort development should provide mitigation for any unavoidable impacts.

- 2. Development should include a minimum 10m buffer zone along both sides of the watercourse to create a corridor favourable to the enhancement of biodiversity. Where a 10m wide buffer zone is not considered possible by the local planning authority, (for example in dense urban areas where existing development comes closer to the watercourse) a smaller buffer zone may be allowed, but should still be accompanied by detailed plans to show how the land will be used to promote biodiversity and how maintenance access to the watercourse will be created. Wherever possible within settlements a minimum 10m buffer should be maintained.

- 3. Proposals should avoid the culverting of any watercourse. Opportunities taken to remove culverts will be supported.

- 4. Outside settlements, proposals for mooring stages will not be permitted. Proposals for posts, earthworks or facing riverbanks with piles and planking will not be permitted except under exceptional circumstances and in agreement with the Environment Agency. Where it is necessary to protect a riverbank from erosion, the protective measures must be designed to maintain and enhance the special character of the river and its environment, including its biodiversity.

- 5. Major development proposals which are located within 20m of a watercourse will require a Construction Management Plan to be agreed with the Council before commencement of work to ensure that the watercourse will be satisfactorily protected from damage, disturbance or pollution.

- 6. Sites for new development with existing culverts will be expected to investigate the feasibility of de-culverting the watercourse. Where bridges are proposed as an alternative to culverting, the construction method should take into account the importance of maintaining an obstruction free bank for wildlife.

Policy ENV5: Green Infrastructure in New Developments

- 1. Development will be expected to contribute towards the provision of additional Green Infrastructure and protect or enhance existing Green Infrastructure.

- 2. Proposals should: i) protect, conserve or enhance the district's Green Infrastructure; ii) provide an appropriate level of Green Infrastructure with regard to requirements set out in the Green Infrastructure Strategy, AONB Management Plan or the Habitats Regulations Assessment; iii) avoid the loss, fragmentation, severance or other negative impact on the function of Green Infrastructure; iv) provide appropriate mitigation where there would be an adverse impact on Green Infrastructure; and v) provide an appropriate replacement where it is necessary for development to take place on areas of Green Infrastructure.

- 3. All Green Infrastructure provision should be designed with regard to the quality standards set out within the Green Infrastructure Strategy, or where relevant the Didcot Garden Town Delivery Plan. Consideration should also be given to inclusive access and contributing to gains in biodiversity, particularly through the use of

appropriate planting which takes account of changing weather patterns. Where new Green Infrastructure is provided, applicants should ensure that appropriate arrangements are in place to ensure its ongoing management and maintenance.

Guidance and Research.

- Natural England Standing Advice regarding Protected Species;
- Biodiversity 2020: A strategy for England's wildlife and ecosystem services;
- Natural England (2023) The Statutory Biodiversity Metric;
- British Standard BS42020: Biodiversity: a Code of Practice for Planning and Development;
- BRE (2014) Biodiversity Guidance for Solar Developments. Eds. G. E. Parker and L. Greene;
- Natural England Technical Information Note TIN101 (2011) Solar Parks: Maximising Environmental Benefits. Natural England;
- Natural England (2017) Evidence Review of the Impact of Solar Farms on Birds, Bats and General Ecology (NEER012) 1st Edition;
- Montag H., Parker G. and Clarkson T. (2016) The Effect of Solar Farms on Local Biodiversity: A Comparative Study. Clarkson and Woods and Wychwood Biodiversity;
- Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. 2021. The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747; and

7.4 Assessment Methodology and Significance Criteria

Assessment Methodology

7.4.1 The standard approach applied in the UK to Ecological Impact Assessment (EcIA) is that developed by the Chartered Institute of Ecology and Environmental Management (CIEEM) in 2016 and revised in 2018[1]. This methodology has been used to evaluate existing conditions, and to assess the significance of likely effects on ecological features that may arise during construction and operation of the Proposed Development. This involves

[1] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM, Winchester.

determining the importance of each ecological feature and undertaking an impact assessment pre and post-implementation of mitigation measures.

7.4.2 When assessing the baseline biodiversity importance of natural features found on the site, the following characteristics are considered:

- Animal or plant species which are rare or uncommon, either internationally, nationally or more locally;
- Ecosystems which provide the habitats required by the above species;
- Species that are afforded legal protection;
- Endemic or locally distinct sub-populations of a species;
- Habitat diversity, connectivity and/ or other synergistic associations;
- Species of Principal Importance under the NERC Act[2];
- Habitat of Principal Importance (HPIs) under the NERC Act;
- Habitats listed as a priority for nature conservation within the applicable County and/or Local Authority Biodiversity Action Plans (LBAPs);
- Notably large populations or concentrations of animals considered uncommon or threatened in a wider context;
- Plant communities that are considered to be typical of valued natural/ semi-natural vegetation types;
- Species at the edge of their range; and
- Species-rich assemblages of plants or animals.

7.4.3 Habitats and species identified in the baseline conditions will all be attributed with an ecological importance. The importance or potential importance of an ecological feature will be described according to its importance in a geographical context i.e. (International, National, Regional, Metropolitan/County, and Local importance). An intermediary category of 'District' importance has been derived and will apply where a feature is present on or adjacent to the site, and is considered to be of higher importance to nature conservation than in a 'Local' context, but is considered to be of lower importance on a 'County' scale. Furthermore, a category of 'Site' importance will be applied to a feature which is present or potentially present at the site, but where the importance to nature conservation of the feature is of relatively low value in the context of the wider landscape. A further 'Negligible' category will be assigned to features of no particular intrinsic nature conservation importance.

7.4.4 The importance of habitats and species which are given special protection under domestic or international legislation is considered within the assessment of the importance of an ecological feature. Therefore habitats or species which are present for which there may

[2] Natural Environment and Rural Communities (NERC) Act 2006

be a potential breach of legislation will be considered to be important ecological features (IEFs), even if the feature itself is not considered to be of significant intrinsic nature conservation importance. Non-statutory designated sites will also be identified as important ecological features where these lie within the zone of influence of the project.

7.4.5 Published selection criteria, contained within the selection of Biological Sites of Special Scientific Interest (SSSI), can also be referred to aid the assessment of importance. Where significant habitats, such as Ancient Woodland, do not carry a designation, these are nevertheless considered at a specified geographic level.

7.4.6 For the purposes of this assessment, only receptors identified within the baseline conditions as being of Local importance or above will be considered 'Important Ecological Features (IEFs)' in line with the guidelines set out by CIEEM. The impacts of the proposed development will only be assessed on those IEFs with importance equal to, or higher than local level. Appropriate mitigation may be proposed for non-IEF where it is necessary to ensure offences are not committed under relevant legislation.

Characterisation of Impacts

7.4.7 When assessing the impact of the development and changes to the baseline conditions on site, predictions will be made which focus solely on the zone of influence whilst taking into consideration the lifetime of the development. The zone of influence has been assessed separately for each individual receptor.

7.4.8 Features considered when defining the zone of influence of the project on each ecological feature include the vulnerability of sites and habitats to the effects of construction and operation of the array, the mobility of species both on and surrounding the site, the sensitivity of species to noise and disturbance, the effects on transient or migratory species and the importance of any particular species or habitats as keystone features within local ecological networks.

7.4.9 Each potential impact on an IEF will be assessed at its respective geographical scale and, where appropriate, using following parameters:

- Positive or negative (whether the impact will have a Positive or Negative effect);
- Magnitude (the size of the impact);
- Extent (area over which impact occurs);
- Duration (time impact expected to last before recovery);
- Reversibility (an impact may be permanent or temporary); and
- Timing and frequency (impact may be seasonal e.g. bird nesting season).

Mitigation Measures

7.4.10 Mitigation measures are described where adverse effects are identified upon the IEFs. The mitigation measures will aim to reduce the overall effect value. It is not always possible to fully mitigate an adverse effect to neutral levels. An assessment of residual effects which takes account of the proposed mitigation is then made. Due consideration is given to the

reliability of mitigation measures and the likelihood that they will achieve their stated goals, using the terms defined above.

7.4.11 Mitigation measures are also identified for species which did not qualify as IEFs but which are afforded legal protection under the Wildlife and Countryside Act (1981) or other legislation, and as such will require certain precautionary methodologies to avoid offences being committed.

Assessment of Significance

7.4.12 Following the methodology described by CIEEM, an ecologically significant effect is defined as

"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".

7.4.13 In line with CIEEM guidance, significance of residual effects will be described as being 'significant' or 'not significant'. As CIEEM guidance avoids and discourages the use of the matrix approaches to assign categories (e.g. minor, moderate, major) to residual effects, 'significant' residual effects will be qualified with reference to the appropriate geographical scale at which the effect is considered to be felt.

Survey Methodology

Desk Study

7.4.14 A desk study and data search was undertaken as follows:

- Statutory designated sites for nature conservation were identified using the Natural England/DEFRA web-based MAGIC map database (www.MAGIC.gov.uk). International-level sites such as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) within 10km from the Site were searched for. National-level sites such as National Nature Reserves (NNRs), Local Nature Reserves (LNRs) and Sites of Special Scientific Interest (SSSIs) within 2km of the Site were searched for.

- The Natural England/DEFRA web-based MAGIC map database was also consulted for records of European Protected Species (EPS) licences issued for mitigation projects concerning EPS within 2km of the Site

- The Thames Valley Environmental Records Centre (TVERC) was consulted for records of protected species and species of conservation concern within 2km of the Site. TVERC was also asked to provide details of locally designated and non-statutory sites for nature conservation within 2km of the Site.

- Ordnance Survey maps (1:25,000) and aerial images of the Site were examined online to allow a better understanding of the context of the Site and its connections to potentially important habitats, known species records and protected sites.

7.4.15 The search radii described above are standard distances used in ecological impact assessment for projects of this nature and scale. It is considered unlikely that the proposed development would give rise to impacts on designated sites beyond these ranges.

Field Surveys

7.4.16 Field surveys undertaken to inform this chapter are summarised in Table 7.1 below. Full details of survey methodologies are provided within the Baseline Ecological Report (Appendix 7.1).

Table 7.1: Baseline Surveys Summary

Survey	Methodology	Timing	Details (Results and Methods)
Extended UKHabitat Classification (UKHabs) Survey	Habitat survey and condition assessment of the site, based on JNCC (2010)[3], IEA (1995)[4] UKHab[5] and Natural England guidance[6]. Including hedgerow assessment and walkover assessment for value of the site for protected and notable species	19th May 2022 Updated on 3rd January 2024	Appendix 7.1
Badger Survey	Site wide badger survey to identify setts and field signs such as latrines, runs and foraging evidence.	19th May 2022 Updated on 3rd January 2024	Appendix 7.1
Ground Level Tree Assessments for Roosting Bats	Daytime ground-based assessment of all trees within the site boundary for potential to support roosting bats. Follows Bat Conservation Trust (BCT) Good Practice Guidelines as informed by the Bat Tree Habitat Key.	19th May 2022 Updated on 3rd January 2024	Appendix 7.1
Breeding Bird Surveys	Surveys adapted from British Trust for Ornithology (BTO) Common Bird Census	Four survey visits spread between 20th May	Appendix 7.1

[3] JNCC (2010) Handbook for Phase 1 habitat survey – a technique for environmental audit. Joint Nature Conservation Committee, Peterborough

[4] Institute of Environmental Assessment (1995). Guidelines for Baseline Ecological Assessment. E & FN Spon, London.

[5] UKHab Ltd (2023). UK Habitat Classification Version 2.0 (at www.ukhab.org)

[6] Natural England (2023) The Statutory Biodiversity Metric: Technical Annex 1 – Condition Assessment Sheets and Methodology.

Survey	Methodology	Timing	Details (Results and Methods)
	methodology[7] as informed by https://birdsurveyguidelines.org.	and 6th July 2022	
Great Crested Newt eDNA Surveys	Great crested newt eDNA survey of all ponds within 500m of the site in accordance with Biggs et al. (2014) [8]	21st June 2022	Appendix 7.1

Limitations

7.4.17 Limitations specific to the surveys conducted are given in the appropriate technical appendix.

7.5 Baseline Conditions

Site Description and Context

7.5.1 The Site is located in Oxfordshire, approximately 550m to the north of the village of Nuneham Courtenay, 900m south of Sandford-on-Thames, and within the Local Planning Authority (LPA) of South Oxfordshire District. The Site is made up of eleven agricultural fields that are predominantly arable, separated by (mainly) native hedgerows and drainage ditches. The surrounding landscape is characterised by further mixed farmland criss-crossed by a network of hedgerows, woodland and ditches. The River Thames flows north-south approximately 400m to the west of the Site, and the outskirts of the city of Oxford lie approximately 1.3km to the north.

7.5.2 The approximate centre of the Site is at Ordnance Survey Grid Reference SP543000. The Site measures approximately 57.5 ha in area.

Designated Sites

Statutory Designated Sites

7.5.3 As revealed by the desk study, there are no-statutorily designated sites for nature conservation present within the search radii applied (10km for International level sites, and 2km for Nation level sites).

[7] Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000). Bird Census Techniques. Academic Press, London

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

Non-Statutory Designated Sites

7.5.4 Fifteen local or non-statutory designated sites for nature conservation were identified within the desk study and are summarised in Table 7.2 below. A map showing the location of these in relation to the Site is provided in Appendix 7.1.

7.5.5 Of these sites, six were Oxfordshire Local Wildlife Sites (LWSs), one was an Oxfordshire Potential Local Wildlife Site (pLWS), and five where Oxford City Local Wildlife Sites (OLWS). These receive protection within the planning system for the relevant LPAs, and are sites recognised for having high wildlife value and/or containing rare of threatened habitats and species. Three of the sites were Oxfordshire Conservation Target Areas (CTAs); within the county, CTAs have been identified as providing the best opportunities for targeted conservation action. They connect and buffer important habitats and species assemblages and have been designed to provide resilience to future climate change.

Table 7.2: Non-statutorily designated sites within 2km of the Order Limits

Site Name	Approximate Distance and Direction from Site	Description / Reason for Designation	Importance
Lower Farm Bottom Meadow Local Wildlife Site (LWS)	0.175km west	Unimproved lowland hay meadow in the River Thames floodplain, isolated by arable land. Very good example of species-rich grassland.	County
Thames at Cherwell and Oxford Conservation Target Area (CTA)	0.175km west	River meadowlands, containing low meadows and wet grassland/ fen/ swamp/ reedbed.	County
Nuneham Arboretum LWS	0.48km south	Unimproved grassland, woodland, parkland and ponds supporting protected and notable fauna	County
Radley Gravel Pits, including Radley Gravel Pits Extension North and Extension South Proposed Local Wildlife Site Extensions (pLWS)	1.3km south west	Former gravel workings, parts of which have partially been restored with an emphasis on wildlife, and other parts left to recolonise naturally. Comprises water bodies, reedbeds, fen, wet woodland and open mosaic habitat on previously developed land. Supports a range of protected and notable flora and fauna.	County
Thames Radley to Abingdon CTA	1.3km south west	Meadowlands and floodplains, containing a range of associated habitats including wetland, fen, wet woodland, and developing grassland	County

Site Name	Approximate Distance and Direction from Site	Description / Reason for Designation	Importance
		and woodland. Important area for nesting lapwing.	
Radley Little Wood LWS	1.45km west	Ancient woodland, with a diverse associated ground flora and notable invertebrate assemblage.	County
Radley Large Wood LWS	1.5km north west	Ancient woodland, with a rich woodland ground flora and butterfly interest	County
Fiddlers Elbow Marsh Oxford City Wildlife Site (OCWS)	1.5km north west	Island between two wide channels of the River Thames. Comprises reedbeds with tall herbs and willow, which in turn supports a variety of associated breeding birds	County
Oxford Heights West CTA	1.58km west	Wooded estates and farmland comprising an important range of habitats, including fen, woodlands, heathland, lowland meadow, acid and limestone grasslands.	County
Minchery Farm OCWS	1.6km north	Abandoned meadow with woodland, marshy grassland and swamp communities.	County
Littlemore Brook OCWS	1.6km north	Minor tributary of the Thames which support water vole	County
Littlemore and Northfield Brooks OCWS	1.8km north	Minor tributaries of the Thames which support water vole. Largely wooded with willows, with some open areas.	County
Sandford Brake LWS	1.8km north east	Unmanaged woodland characteristic of ancient woodland, supporting a diversity of associated flora	County
Kennington Memorial Field LWS	1.8km north east	Pasture grassland containing elements of species-rich lowland meadow and lowland calcareous grassland, with some scrub patches. Supports a high diversity of bird and invertebrate species.	County

Site Name	Approximate Distance and Direction from Site	Description / Reason for Designation	Importance
Spindleberry Park OCWS	1.9km north	Public park at the southern edge of Oxford. Woodland and marginal vegetation along a brook. Supports water vole and has invertebrate interest.	County

7.5.6 Of the above designated sites, Thames at Cherwell and Oxford CTA and Thames Radley to Abingdon CTA will be included within this assessment as they are both hydrologically connected to the Site via drainage ditches and the River Thames.

7.5.7 The remaining locally designated sites are considered to be of sufficient distance from the site (at least 200m and with no or poor connectivity) such that no direct or indirect impacts are likely to occur as a result of the development proposals, and are therefore considered to be outside of the zone of influence.

Habitats

Arable

7.5.8 This was the most frequently encountered habitat at the site, accounting for approximately 56.3ha of the land within the Site boundary. At the time of field surveys, the arable fields were laid to either cereal crop or rapeseed. Due to the intensive agricultural management of these areas, very little other flora was present besides the monoculture crops, with the exception of a small number of persistent and widespread weed species including scentless mayweed *Tripleurospermum inodorum* curled dock *Rumex crispus* and prickly sow thistle Sonchus asper, which were occasionally encountered.

7.5.9 The land within the cultivated arable fields holds very little intrinsic value for biodiversity, is frequently encountered in the wider landscape, and is considered to be of **Site Importance**. It should however be noted that the arable fields do provide habitat for a number of different wildlife species. The relative importance of the arable habitat for species or species groups associated with the habitat is assessed individually so as to avoid pseudoreplication within the impact assessment.

Other Neutral Grassland

7.5.10 A circa 6m wide strip of moderately diverse, tussocky grassland was present alongside much of the Site boundary. This was notably higher in species-richness than the other narrow field margins at the Site. A newly planted hedgerow separated this grassland from the adjacent arable fields to the east. Although this is likely to provide opportunities for a range of wildlife species, this habitat was small in extent (approximately 0.54 ha) and is considered to be of **Site Importance**.

Modified Grassland

7.5.11 The Site boundary contained a small (circa 0.013 ha) portion of a species-poor agricultural grassland field, dominated by a restricted range of competitive grass and herbaceous species. Given the small extent of this habitat and lack of botanical interest, this is unlikely

to be of importance for wildlife this and was considered to be of no more than **Site Importance**.

Broadleaved Plantation Woodland

7.5.12 A circa 0.4ha block of planted broadleaved woodland was present in the south of the Site. This was relatively young and was entirely fenced for use as a pheasant rearing pen, and there was little in the way of associated woodland ground flora. There was noted to be a high proportion of fallen dead wood which is likely to attract a range of associated wildlife species.

7.5.13 Although relatively small in extent and somewhat compromised by its current use as a pheasant rearing pen, the woodland habitat nevertheless likely supports a range of associated wildlife and adds diversity to the otherwise arable landscape. Overall, this habitat is considered to be of **Local Importance**.

Hedgerows and Line of Trees

7.5.14 All hedgerows on Site constitute a Habitat of Principal Importance. A total of 15 hedgerows and one line of trees were present within the Site, together measuring approximately 4.6km in extent. The hedgerows varied in terms of species diversity, structural diversity and management, although the majority of hedgerows appeared to be unmanaged at the time of survey.

7.5.15 They are likely to support a wide range of wildlife species and all of the hedgerows on-site contribute to the connectivity of the habitats within the local landscape.

7.5.16 Hedgerows are targeted for conservation at national scale. This habitat is considered to be of **Local Importance**.

Ditches

7.5.17 A network of drainage ditches were present at some of the field boundaries. The majority are associated with hedgerows on one of the bank tops., although open ditches with no overshading vegetation were also present. During field surveys conducted between May and July 2022, all of the ditches were either dry or held very little water, although aquatic/marginal vegetation could be seen in several which indicated seasonal inundation. During an update survey in January 2024, which followed a period of heavy rainfall, several of the ditches held water although some still remained dry. It is likely that the network of ditches are seasonally wet but regularly dry up, at least during the spring and summer months.

7.5.18 The ditches are likely to support a range of species which utilise seasonally wet drains, such as invertebrates, reptiles and amphibians, although would not support species which require the present of year round water such as fish, water voles and many aquatic invertebrates and plants.

7.5.19 However, the seasonally wet ditches are hydrologically connected to watercourses of higher ecological importance, namely the River Thames, most closely via 380m of drain lying to the west of the Site. When the ditch systems at the Site are full (with water) any

interconnected watercourses downstream of the Site may be subject to adverse effects associated with construction and operation.

7.5.20 Overall the network of seasonally wet ditches present at the Site is considered to be of **Local Importance.**

7.5.21 In the Scoping Opinion received from the Countryside Office for the LPA, it was requested that the impacts of the Proposed Development on the ditch network was considered expressly within this ES chapter.

Species

Badgers

7.5.22 Records from TVERC confirmed the presence of seven known badger *Meles meles* setts within 2km of the Site. The status and precise locations of the setts are kept confidential. Records of numerous other badger sightings, road casualties and field signs from within 2km of the Site were also held by TVERC. The closest of these was a road casualty from the A4074 road adjacent to the south east of the Site.

7.5.23 A total of five badger setts were recorded within or adjacent to the Site, as well as a number of field signs such as latrines, foraging pits, hairs and mammal paths. At the time of writing, the setts recorded on site were categorised into the following types:

- One Main Sett;
- One Annexe Sett; and
- Three Outlying Setts

7.5.24 The Site contains large extents of habitat suitable for foraging by badgers, across the arable fields and the field margins. Badgers predominantly feed on soil invertebrates, particularly earthworms, but will take a wide variety of plant and animal prey items depending on availability. Arable fields have a lower earthworm abundance than grassland fields and badgers will often favour permanent pasture as a foraging resource. However, there is a lack of this habitat type within the Site, and the arable fields present are therefore likely to represent key foraging grounds for the local social groups of badgers.

7.5.25 Badgers are not a species of conservation concern but receive legal protection on account of historic and ongoing persecution. Consequently, they are considered to be of **Site importance** in terms of conservation status. They will be included within the impact assessment nonetheless due to these legal obligations.

Bats

7.5.1 All bat species and their roosts are fully protected under the Habitats Regulations, and several are Species of Principal Importance. The data search revealed numerous existing field records of at least 7 species of bat from the desk study area. In addition, five known unspecified roost sites belong to brown-long eared bat, soprano pipistrelle, and Myotis sp bats exist within 5km of the Site.

7.5.2 The majority of the trees present within and adjacent to the site did not display signs of damage or decay which usually leads to potential roosting features (PRFs) forming within trees. However, five trees within field boundary habitats at the Site were identified as either

displaying potential roosting features (PRFs) or having potential to support PRFs based on the size, age and/or evidence of damage or decay associated with the tree.

7.5.3 No further detailed survey has been undertaken to establish the presence or likely absence of bat roosts within these trees, on the basis that they will be retained and protected as part of the proposals (further discussed in section 7.7 below) and there would no impacts on roosts, if present.

7.5.4 The heavily managed arable fields with narrow field margins comprising the majority of the Site offer suboptimal habitat for bats when foraging and when commuting between roost sites and foraging areas. However habitats at the field boundaries, including hedgerows, tree lines, ditches, woodland and the strip of other neutral grassland along the eastern Site boundary are likely to represent valuable foraging and commuting habitat for bat species present within the area.

7.5.5 No further detailed bat survey work was considered necessary to inform this assessment as all key habitat features at the field boundaries likely to be utilised by bats will be retained.

7.5.6 Based on the habitat suitability, existing records of bats within the vicinity and potential for roost sites to be present, the Site was considered to be of **Local Importance** to bat species.

Dormice

7.5.7 Dormice are a European Protected Species and are also a Species of Principal Importance.

7.5.8 No records of dormice were revealed by the desk study and this species is believed to be sparsely distributed in Oxfordshire, although is likely under recorded. The hedgerow and woodland network and woodland across the site offers suitable habitat (albeit of varying quality) for dormice, and is connected to areas of optimal habitat in the form of woodland in the landscape to the south. The arable fields comprising the majority of the Site are highly unlikely to be used by this largely arboreal species.

7.5.9 Applying the precautionary principle, it has been assumed this species is present within suitable habitat at the Site, namely hedgerows, tree lines and woodland. As this habitat will be almost entirely retained and protected as part of the proposals, no further survey was considered essential or proportionate to inform this assessment. The site would likely be of **District Importance** for dormice if present at the site.

Otter

7.5.10 Otters are a Species of Principal Importance and protected under the Habitats Regulations.

7.5.11 This species is known to be present along the River Thames, which lies approximately 380m west of the Site at the closest point, with numerous records existing from along the river in this location.

7.5.12 The ditch network at the Site was noted to be dry for much of the year, meaning it is highly unlikely to represent valuable habitat for otters when foraging or for holt/couch sites. It is feasible that individual otters could utilise hedgerow bases and ditches to cross the site when moving between foraging ground and holt sites. There is however a lack of aquatic

habitats in the immediate vicinity of the Site, meaning otters associated with the River Thames are only likely to visit the Site infrequently at most.

7.5.13 The Site is considered to be of **Site Importance** for otters if present.

Water Vole

7.5.14 Water voles are protected under the Wildlife and Countryside Act 1981 and a Species of Principal Importance.

7.5.15 31 records of this species since 2000 exist as revealed by the data search, primarily associated with the River Thames as well as Littlemore Brook, a tributary which runs through the southern suburbs of Oxford. The closet record is from the Thames, approximately 600m north west of the Site.

7.5.16 The majority of the ditch network at the Site offers suitable foraging and burrowing habitat for water voles. However, the ditch network does not appear to hold water year round, with all ditches found to be dry over the course of site visits made between May and July 2022., for Phase 1/UKhab and breeding bird surveys. Whilst several ditches were found to hold water in January 2024 (following a period of heavy rainfall), water voles are generally reliant on permanent presence of water as a habitat requirement for predator evasion.

7.5.17 Given the Site's lack of features which hold water permanently, specific water vole surveys were not considered proportionate to undertake at the Site. It is considered that water voles are likely to be absent from the Site, and the Site is consequently of **Negligible Importance** for this species. Water voles are not considered further within this assessment.

Other Mammals

7.5.18 Other mammals which are Species of Principal Importance, are potentially present on site (nearby records appear in the data search) and are capable of being impacted include polecat, brown hare and hedgehog.

7.5.19 Two polecat road casualty records from the village of Nuneham Courtney were revealed by the desk study, the closest of which was approximately 720m south of the Site. Polecat favour sheltered habitats with abundant prey such as small woodlands, mature hedgerows, scrub and tall grassland with good rabbit and rodent populations. This habitat is relatively poorly represented at the Site, although given the presence of nearby records, the Site possibly forms part of the home range of individual polecats. The regular disturbance of ground within the extensive arable habitat is considered to reduce the likelihood that a significant polecat population is present. Consequently, the site is likely to be of **Local Importance** for polecat.

7.5.20 Brown hare have not been recorded on the Site during field work to date. However, they have been frequently recorded within the local area as revealed by the desk study. All existing records of this species within the search area were from Marsh Baldon, on the opposite site of the A4074 road which may inhibit brown hare movement to some extent. The arable farmland at the Site offers suitable habitat for this species. If present, brown hare are likely to be in small numbers and would be considered to be of **Site Importance**

7.5.21 Hedgehogs are likely to be present across the Sites in low numbers, particularly in field boundaries, with numerous records of this species being present within the desk study data. Hedgehogs typically require sheltered habitats such as woodland edges, scrub and

hedgerows, as well as gardens in order to forage for invertebrate food and make shelter. The Site does not represent optimal habitat, being dominated by arable cropland and with a fenced off woodland, and the Site is considered as being of **Site Importance** for this species.

Reptiles

7.5.22 All UK reptiles are Species of Principal Importance and receive varying levels of protection under the Wildlife and Countryside Act 1981.

7.5.23 The data search revealed records of two species of reptile within 2km of the Site. Twenty one records of grass snake *Natrix helvetica* exist, all of which are >1.9km from the Site. Thirteen records of slow-worm *Anguis fragilis* also exist from the search area. The majority of these records are from a former allotment site, approximately 2km to the north, which has since been developed for residential housing. Aside from these, a single record of slow-worm also exists from a location approximately 1.84km to the north-west.

7.5.24 Suitable habitat for reptiles is limited at the Site, being restricted to hedgerow bases, ditches, and field margins, which are all generally to be retained as part of the Proposed Development. For these reasons, specific reptile surveys were not considered proportionate to undertake at the Site.

7.5.25 Considering the restricted extent and suitability of habitats for reptiles, and their likely presence at the Site at low or very low densities, the Site is considered to be of **Site Importance** for reptiles. They will be included within the impact assessment nonetheless due to the legal protection afforded to them.

Amphibians

7.5.26 Great crested newt (GCN) and common toad are Species of Principal Importance. A number of records of these species were revealed by the desk study, although the closest records were at least 1km from the Site.

7.5.27 No waterbodies were present within the Site or at the Site boundary. From a desk based study of maps and aerial images, a single pond was located within 500m of the Site, approximately 300m to the south east, with another pond located approximately 520m to the south east. Both ponds were subject to GCN eDNA surveys in June 2022, which recorded negative results for GCN, indicating the likely absence of this species from the ponds (and consequently the Site given the lack of other suitable breeding features).

7.5.28 More widespread amphibians, such as common toad and common frog may use the field boundary habitats, in the form of hedgerows, ditches and narrow field margins during the terrestrial phase. However, considering the distance of suitable breeding ponds from the Site, amphibians are unlikely to be found within these habitat in significant numbers, and highly unlikely to be found within the arable fields which offer poor terrestrial habitat.

7.5.29 The Site is considered to be of **Site Importance** for amphibians if present.

Birds

7.5.30 The desk study returned records pertaining to 85 species within 2km of the Site, which are recognised as Red or Amber listed Species of Conservation Concern by the British Trust

for Ornithology (BTO)[9], and/or listed on schedule 1 and 2 of the Wildlife and Countryside Act (as amended), which receive additional protection when breeding.

7.5.31 Breeding bird surveys were undertaken between May and July 2022 and full details of these surveys are given in Appendix 7.1. The survey area encompassed a wider area than that within the Site boundary. In total, 30 bird species were recorded during the surveys. 10 of the 30 species are listed as species of conservation concern, being either red listed or amber listed according to the BTO.

7.5.32 No surveys to ascertain the use of the site by birds during the winter have been undertaken. However, the site is not located near any sites designated of importance for wintering birds, or coastal/estuarine habitats or large waterbodies, and thus is highly unlikely to be of importance for flocks of wintering birds, specifically waders and waterfowl. The hedgerows and woodland are likely to be used for foraging and sheltering by a variety of farmland birds during the winter, such as thrushes, buntings, sparrows and finches.

7.5.33 Birds breeding within the site can be divided into two different categories; namely ground nesting birds that potentially breed within the open fields, and which require open sightlines for predator avoidance during nesting, and other bird species which nest within boundary vegetation such as hedgerows, trees and scrub. This assessment will separately assess the impacts on ground nesting birds and other breeding birds, as the proposals are likely to affect these two different categories in distinct ways.

7.5.34 Most of the bird species recorded at the site were found to be associated with the boundary habitats, predominantly within the woodland and hedgerows. The exception to this was skylark *Alauda arvensis* which were considered to be nesting within the open fields, and for which the development site was believed to support approximately 4-5 territories.

7.5.35 The open field habitats provided good habitat for nesting skylarks, although the number of territories (density of around 0.07 - 0.087 per hectare) was significantly lower than reported maximum skylark densities which can be supported by lowland farmland arable habitat (approximately 0.5 pairs per hectare[10][11]), indicating the Site is not of high importance for local skylark populations. Skylarks are, however, a Species of Principal Importance and red listed Birds of Conservation Concern. The Site has therefore been assessed as having **Local Importance** for birds of open farmland.

7.5.36 The woodland and hedgerow habitats were found to be used for breeding and/or foraging by a relatively modest range of species of conservation concern, generally in small to moderate numbers. This includes yellowhammer *Emberiza citrinella*, linnet *Linaria cannabina*, song thrush *Turdus philomelos* and dunnock *Prunella modularis*. These habitats also provided opportunities for foraging and shelter for farmland birds during the winter. Overall, the Site has been assessed as being of **Local Importance** for the recorded assemblage of bird species associated with boundary habitats.

Invertebrates

9 Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. 2021. The status of our bird populations the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747

10Poulsen J.G., Sotherton N.W. & Aebischer N.J. (1998) Comparative nesting and feeding ecology of skylarks Alauda arvensis on arable farmland in southern England with special reference to set-aside. Journal of Applied Ecology, 35, 131-147

11 P.F. Donald , A.D. Evans , D.L. Buckingham , L.B. Muirhead & J.D. Wilson (2001) Factors affecting the territory distribution of Skylarks Alauda arvensis breeding on lowland farmland, Bird Study, 48:3, 271-278,

7.5.37 The data search revealed a number of existing records of notable butterfly and moth species from within the local area, the majority of which arise from Harcourt Aboretum, an arboretum operated by the University of Oxford situated approximately 1km south of the Site. The site lies within a Buglife 'B-line', which are a network of 3km wide pathways across Britain connecting the best remaining wildflower-rich habitats, and which are targeted for habitat enhancement for pollinating insects[12].

7.5.38 With the exception of the strip of species-rich grassland strip along the eastern Site boundary, the narrow field margins provided habitat of limited value to pollinating insects such as bees and butterflies due to the low diversity of flowering plants. Other habitats at the margins and boundaries of the field are likely to be of value for a range of invertebrate species typical of hedgerows, tree lines and seasonally wet ditches. However, assemblages of invertebrates supported by the arable fields comprising the vast majority of the site are likely to be poor, particularly for pollinating species.

7.5.39 Overall, it is considered that invertebrate assemblages using the site and immediately adjacent habitat are of **Local Importance.**

Invasive Species

7.5.40 No observations of invasive non-native species have been made during any of the fieldwork carried out to date. Species particularly closely looked for were Himalayan balsam, Japanese knotweed and giant hogweed.

7.5.41 Consequently, these are not considered further within this assessment.

Table 7.3: Summary of Ecological Evaluation

Ecological Feature	Ecological Importance	Important Ecological Feature?
Designated Sites		
Thames at Cherwell and Oxford CTA	County	Yes
Thames Radley to Abingdon CTA	County	Yes
Thirteen other non-statutorily designated sites listed in Table 7.2	County	No – considered to be outside of the Zone of Influence principally due to the distance from site.

12 https://www.buglife.org.uk/our-work/b-lines/

Ecological Feature	Ecological Importance	Important Ecological Feature?
Habitats		
Arable	Site	No
Other Neutral Grassland	Site	No
Modified Grassland	Site	No
Broadleaved Plantation Woodland	Local	Yes
Hedgerows and Line of Trees	Local	Yes
Ditches	Local	Yes
Species		
Badgers	Site	No, but included in assessment due to legal protection of species.
Bats	Local	Yes
Dormice	District (if present)	Yes
Otter	Site	No
Water Vole	Negligible	No
Polecat	Local	Yes
Brown hare	Site	No

Ecological Feature	Ecological Importance	Important Ecological Feature?
Hedgehogs	Site	No
Reptiles	Site	No, but included in assessment due to legal protection of species.
Amphibians	Site	No
Birds – of Open Farmland	Local	Yes
Birds - Other	Local	Yes
Invertebrates	Local	Yes
Invasive Species	Negligible	No

7.6 Scheme Design, Embedded Mitigation and Sources of Potential Ecological Impact

7.6.1 As described within **Chapter 3**, the Proposed Development will comprise the construction, operation, maintenance and decommissioning of ground mounted PV Modules and a new substation compound. PV Modules will be mounted on a metal mounting system up to a maximum height of 3.5m. Cables linking the rows of panels are buried in the ground within trenches. Further cables are used to link areas of panels to transformer and switchgear substations which are constructed on concrete pads, which are then linked. Internal access tracks are required, which involve the laying of permeable aggregate. A new main site access is to be created via an existing farm gateway from the A4074 at the east of the Site.

7.6.2 Assessment is made of impacts which might arise during both the construction phase (which is anticipated to last up to two years) and the operational phase (which it is estimated to be 40 years for the purposes of the EIA). An assessment of effects within the decommissioning phase has been set out in Section 7.9.

Potential Sources of Impact

7.6.3 Chartered Institute of Ecology and Environmental Management (CIEEM) guidance draws a necessary distinction in Ecological Impact Assessment between 'impacts' and 'effects'. An 'impact' is an action resulting in changes to an ecological feature, whereas an 'effect' is the

outcome to an ecological feature from an impact. Impacts are discussed here while potential effects and relevant mitigation measures are discussed later in this chapter.

7.6.4 The following sources of ecological impacts are given here to provide context in the assessment of effects. The examples given are not exhaustive.

Construction Phase

- Habitat Loss and Habitat Change: Limited habitat loss (for example at hedgerows) may occur where access for construction and operation is required where existing field accesses cannot be used or need to be widened. Other examples include clearance to facilitate any permanent hard standing such as foundations or footings, or temporary surfaces for compounds and access. Habitat change will principally be associated with the reversion of arable fields to grassland and other habitats through management, as well as habitat creation where valuable habitat creation opportunities are identified.

- Killing and Injury: Habitat clearance and the actions of plant during construction has the potential to cause direct harm to species.

- Fragmentation: Described by CIEEM as, "The breaking up of a habitat, ecosystem or land-use type into smaller parcels with a consequent impairment of ecological function". Potentially in combination with habitat loss and habitat change, fragmentation can reduce the function of a habitat as well as impede the ability of a species to disperse and maintain a viable population. Installation of fencing or culverting streams may also cause fragmentation, as well as through excessive light and noise disturbance.

- Disturbance: Pressures or changes in the environment acting on individuals of a species so as to alter their behaviour may arise through noise, movement and vibration during construction operations, as well as increased human presence.

- Pollution and Habitat Degradation: Release of chemical, sediment or dust pollution can interfere with the normal function of habitats and directly harm species, while processes such as erosion, compaction and alteration of soil/water chemical composition cause the degradation of habitat quality. The construction phase risks the release of pollutants through vehicle and plant movement/operation as well the introduction of new materials onto and into the soil. Protection of sensitive features will be important in safeguarding them throughout the life of the scheme.

- Habitat Creation and Enhancement: Beneficial effects are likely to arise from the creation of new grassland and hedgerow habitats on site, as well as the enhancement of retained habitats through development-free buffer zones and increased habitat connectivity. Beneficial effects may also be derived from the cessation of cultivation, chemical treatments and soil inputs.

Operational Phase

- Habitat Loss and Habitat Change: Significant impacts from these are not anticipated as operation will be largely benign, unless major unexpected maintenance or repair events are required. Ongoing habitat maintenance will seek to ensure favourable condition and enhancement of all newly created and retained habitat for the life of the scheme. Ecological monitoring will be key to realising this.

- Killing and Injury: Routine operational works are unlikely to give rise to these effects although there is the risk of direct harm to species from the movement of vehicles around the site, or the trapping of certain species within the fencing or fenced area.

- Fragmentation: The presence of a solar project is anticipated to be habituated to by most species, especially with the creation of new, and enhancement of retained, habitats. Typical perimeter fencing is not considered to impede the movement of most mammals, although movement of deer is likely to be impacted. Migrating birds and bats may interact with or be perturbed by the surfaces of the solar array so this will be considered in the assessment.

- Disturbance: Operational disturbance may occur through the routine movement of vehicles and personnel on site, as well as the presence of low-level noise associated with electrical equipment. Light reflection may be another factor.

- Pollution and Habitat Degradation: The risk of these impacts during operation are very low. Good maintenance practice will be key to avoid further pollution events or degradation of adjacent habitats.

- Habitat Creation and Enhancement: Ecological benefits can be maximised through the implementation of a habitat management and monitoring scheme for the life of the development. Beneficial effects may also be derived from the cessation of cultivation, chemical treatments and soil inputs.

Decommissioning Phase

- Considering the anticipated lifespan of the Scheme, the accurate prediction of decommissioning effects is challenging and can only be informed by the legal, policy and conservation constraints and priorities present at the time of the DCO application. Decommissioning impacts are considered within Section 7.9 of this Chapter and may arise from:

- Habitat Loss and Habitat Change: It is assumed that the fields will be able to be returned to agricultural use upon decommissioning, therefore this habitat change will need to be considered, including impacts on any newly created habitats.

- Killing and Injury: As per the construction phase, risks for direct harm to species should be discussed.

- Fragmentation: While the removal of development infrastructure as a reversal of the construction phase is unlikely to result in habitat fragmentation, the reversion to agriculture may impact the habitats and species which have arisen as a result of the Scheme.

- Disturbance: Disturbance impacts are likely to be the same as the construction phase.

- Pollution and Habitat Degradation: Pollution and habitat degradation risks are likely to be the same as the construction phase.

Design Elements with Embedded Ecological Mitigation

7.6.5 'Embedded mitigation' measures are those which aid the avoidance or reduction of impacts through the choices made in the design of the Scheme. Conversely, 'additional mitigation' applies to further measures required to reduce specific identified impacts; these are detailed within the Assessment of Effects in Section 7.7. Embedded mitigation measures inherent within the Scheme design comprise:

- The scheme design has carefully integrated the hedgerows, line of trees, woodland ditches and field boundaries into the final layout. The Proposed Development will avoid and minimise direct impacts to these features by using existing gateways, access tracks and gaps in hedgerows. Where possible, these have been prioritised for access, routing construction and maintenance tracks and for the perimeter deer fencing. Gaps are expected to be created or widened for access in 6 places, with each requiring no more than 5m of hedgerow removal. No access gaps will be wider than 8m.

- An undeveloped, retained buffer zone of at least 4m has been integrated into the design of the scheme, from the edge of all field boundaries.

- When constraints presented by badger setts were identified, the scheme was redesigned so to ensure the avoidance of these feature.

- A total of circa 2.7km of new, native, species-rich hedgerow planting will be provided at the Site in several places These hedgerows will increase connectivity and foraging opportunities for a range of species including, birds, bats, and small mammals, as well as helping to screen the proposals from Public Rights of Way (PRoWs)

- Following construction, the land beneath the solar array will be sown grassland and either grazed by sheep or managed via a mowing regime.

Scheme-wide Additional Avoidance and Mitigation Measures

Construction Environmental Management Plan

7.6.6 A Construction Environmental Management Plan (CEMP) will be prepared for the Site and will describe measures to avoid, minimise or mitigate any construction-phase impacts on the environment. In particular, the CEMP will identify risks to the aquatic environment associated with the ditches, identify potential pollution pathways, and describe mitigation measures to be employed. Best practice methodology with adequate contingency planning will be formalised and incorporated into the CEMP to reduce the risk of a pollution event occurring. The CEMP can be secured by a planning condition.

Biodiversity Protection Plan (BPP)

7.6.7 A Biodiversity Protection Plan (BPP) will be prepared for the scheme and will describe measures to avoid, minimise or mitigate construction-phase impacts on important ecological features which are typically outside the scope of a typical CEMP. The BPP will include additional measures, including 'biodiversity protection zones' and any timing constraints, for safeguarding badgers, reptiles, and wild birds. The BPP can be secured by a planning condition.

Landscape and Environmental Management Plan (LEMP)

7.6.8 A Landscape and Environmental Management Plan (LEMP) will be prepared for the operational site to prescribe how retained and newly created habitats are managed to maximise their biodiversity value. The LEMP will also set out any measures necessary to ensure protected species are accommodated. The LEMP will include employing good horticultural practices, such as the use of peat-free composts, mulches and soil conditioner, and avoiding the use of herbicides, pesticides and fertilisers within landscape planting areas. The LEMP will also set out a post-construction monitoring scheme to assess the long-term efficacy of mitigation and enhancement measures. The LEMP can be secured by a planning condition.

7.7 Assessment of Effects

7.7.1 This Section identifies and characterises construction and operation phase impacts on each Important Ecological Feature of the Scheme considered possible according to baseline data and Scheme designs. Embedded mitigation measures to avoid and mitigate for these impacts are considered, and any additional mitigation required is set out. Thereafter, an assessment is made of the significance of any residual effects after all mitigation measures have been accounted for. Ecological enhancements which will or may be adopted are also outlined.

Designated Sites

Thames at Cherwell and Oxford CTA & Thames Radley to Abingdon CTA

Construction Phase Impacts

7.7.2 The Thames at Cherwell and Oxford CTA is hydrologically connected to the Site by circa 175m of drainage ditch at the closest point, whilst the Thames Radley to Abingdon CTA is hydrologically connected via circa 2.1km of drainage ditches and the River Thames.

7.7.3 At such distances there is no risk of direct damage to either designated site. In the absence of mitigation however, there is a risk that the habitats supported by both CTAs may be degraded through indirect impacts such as the release of sediments or pollutants which could flow into connected watercourses off site. Accidental pollution events are considered unlikely, but if they were to occur they would potentially have a detrimental effect on the quality of habitats downstream beyond the Site. This is likely to be a reversible and short term immediate adverse effect but the impacts could be felt in the medium term while sensitive habitats/species recover.

7.7.4 The risk of impacts occurring in this way are likely to be higher during construction works taking place over the autumn, winter and early spring when the on-site ditches appear to be seasonally wetted.

7.7.5 Given the distance of the Thames Radley to Abingdon CTA from the Site, it is likely that most sediment or other pollutants arising from construction activities would dissipate before reaching the CTA.

7.7.6 It should also be noted that a certain amount of dust deposition and run off would be anticipated as a result of routine annual agricultural activities and as such effects are likely to be similar to the current baseline conditions.

Operation Phase Impacts

7.7.7 Operation of the site will require minimal input with only occasional maintenance visits expected. Most vehicles will utilise the access tracks and any disturbance to the ground is likely to be of a reduced magnitude to that already caused through regular agricultural management practices. No impacts on either CTA are anticipated as a result of the operational phase of the Scheme.

Mitigation Measures

7.7.8 An undeveloped buffer zone of at least 6m (typically larger) has been established from the top of all existing ditch banks which will reduce the risk of potential pollutants entering the on-site watercourses and potentially degrading the CTAs downstream.

7.7.9 The negative impacts of possible spoil deposition and runoff on the CTAs to the site will be further mitigated by the implementation of the CEMP to be prepared for the Scheme. This will restrict working during periods of heavy rain and outline the installation of silt fencing, if required. The CEMP will also set out best-practice pollution prevention guidelines to avoid/minimise the risks of pollution or sedimentation events occurring.

7.7.10 The BPP will also prescribe periodic monitoring of the condition of on-site ditches during construction with remedial measures taken where damage or degredation is identified.

Residual Effects

7.7.11 With pollution prevention measures in place, pollution events can be mitigated and so the residual effect on the CTAs is considered **Negligible (Not Significant**).

Habitats

Broadleaved Plantation Woodland

Construction Phase Impacts

7.7.12 The existing woodland will be retained in full as part of the Scheme. However, in the absence of mitigation there is potential for damage or compaction to tree roots when installing the fencing and array structures. Damage to roots may lead to permanent, irreversible damage resulting in the death of the tree.

7.7.13 Construction activities could lead to a small amount of temporary noise and possibly light disturbance to the species within the woodland. There is the potential for some dust deposition or runoff on the woodland flora generated by the traffic moving into and around the construction zone. Such effects would be temporary and reversible in the short-term. It should also be noted that a certain amount of noise disturbance, dust deposition and runoff would be anticipated as a result of routine annual agricultural activities, and as such effects are likely to be similar to the current baseline conditions.

Operation Phase Impacts

7.7.14 Regular movement of traffic adjacent to the woodland edges is not anticipated during operation of the array and the potential for damage and disturbance (e.g. noise & vibration) is anticipated to lower than the current baseline level of risk associated with the regular

farming activities on site. As such the potential operational site management effects on the woodland are expected to be negligible.

7.7.15 The cessation of intensive arable farming practices, including spraying crops with pesticides & herbicides, is likely to be of benefit to the woodland habitat present at the Site as this is currently likely to be subject to spray drift. In particular, this would encourage the growth of woodland ground flora. This impact would last for at least the duration of the array.

Mitigation Measures

7.7.16 A minimum buffer zone of 10m from the edge of the woodland will be implemented and would be adequate to avoid the identified impact of root damage/compaction.

7.7.17 Site perimeter deer fencing will be installed prior to construction commencing, in order to demarcate the buffer between the woodland and construction area. Construction crew will be informed that no materials should be stored or vehicles driven within this area via a toolbox talk delivered to all key construction staff at the commencement of construction In this way, the tree roots, will be protected from inadvertent damage during construction.

7.7.18 A CEMP prepared for the site will prescribe details the measures required to minimise the dust deposition and run-off which may affect the woodland habitat. This includes how dust-generating activities will be avoided, ensuring stockpiles of spoil and site materials will be stored away from field boundaries, restrictions on working close to woodlands during periods of heavy rain and the installation of silt fencing and/or temporary drainage channels if necessary.

Residual Effects

7.7.19 The mitigation implemented will ensure that the woodland areas will be protected from adverse impacts during construction. A residual **Neutral** effect is anticipated, which is **Not Significant.**

Hedgerows and Line of Trees

Construction Phase Impacts

7.7.20 The scheme will avoid and minimise direct impacts upon hedgerows and the line of trees by utilising existing gateways for access where possible. In six locations, minor removal of hedgerows will be required to facilitate construction and operational maintenance access. Where breaches within existing hedgerows will be necessary, these will be no more than 8m wide and typically less. The anticipated cumulative loss of circa 30m in total would only represent a small fraction (0.65%) of the hedgerow habitat on site, which is 4.6km in total. As such habitat loss is expected to have a neutral effect on hedgerows. The small size of the gaps will not result in fragmentation of this habitat.

7.7.21 There is a small risk of accidental damage to the hedgerows, either as a result of vehicles colliding with hedgerows or via vehicular damage to the flora at the hedgerow bases. Erection of perimeter deer fencing around the site will limit any damage to hedgerows at the perimeter of the site, although interior hedgerows may be at higher risk where perimeter deer fencing is not required.

7.7.22 There is the potential for some dust deposition or runoff on the hedgerow flora generated by the traffic moving into and around the construction zone. Such effects would be

temporary and reversible in the short-term. It should also be noted that a certain amount of dust deposition and runoff would be anticipated as a result of routine annual agricultural activities and as such effects are likely to be similar to the current baseline conditions.

Operation Phase Impacts

7.7.23 Regular movement of traffic adjacent to the hedgerow network is not anticipated during operation of the array and the potential for damage and disturbance (e.g. noise & vibration) is anticipated to be the lower than the current baseline level of risk associated with the regular farming activities on site. As such the potential operational site management effects on hedgerows are considered to be neutral

7.7.24 The cessation of intensive arable farming practices, including spraying crops with pesticides & herbicides, is likely to be of benefit to hedgerow habitats on site, particular the ground flora at hedgerow bases.

7.7.25 The creation of 2.7km of new, native hedgerow along the PRoW and at the Site boundaries, in addition to strengthening of existing gaps in several places around the Site, will greatly increase the extent connectivity of this habitat. The landscaping proposals lead to an approximately 67% gain in hedgerow extent on Site (currently approximately 4.6km of hedgerow on site).

Mitigation Measures

7.7.26 Impacts resulting from dust deposition and runoff will be reduced through the implementation of a CEMP. This will set out restrictions on working during heavy rain and installation of a silt fence if required, and measures designed to minimise dust generating activities on site.

7.7.27 The deer fencing will be installed prior to construction commencing at a minimum of 4m from the hedgerows. This will act as protective fencing during construction and all contractors will be briefed to ensure that vehicles are not driven within this buffer or construction materials stored here.

7.7.28 All internal hedgerows (i.e. those not protected by site perimeter fencing) will be protected through the installation of suitably protective temporary fencing, placed at least 4m from the hedgerow. This will act as protective fencing during construction for hedgerows which would not otherwise be protected by deer fencing.

7.7.29 Subsequent to the implementation of the mitigation measures, it is considered that the detrimental impacts associated with the construction phase can be reduced to neutral.

7.7.30 The LEMP prepared for the site will prescribe ongoing management for retained and newly created hedgerows to maximise their biodiversity value in the long-term. This includes rotational cutting of the hedgerows to ensure a diversity of habitats on the site each year and the aim at maintaining hedgerows at a minimum height of 3m as this has been demonstrated to be important for promoting the biodiversity value of hedgerows[13] .

[13] (Environmental Stewardship Farm Environment Plan Guidance 005. 2005).

Residual Effects

7.7.31 The mitigation described will seek to ensure potential construction related impacts are avoided. The planting of 2.7km of new, native hedgerow will significantly increase the extent of this habitat and improve connectivity across the site, and overall there is expected to be residual beneficial effect on hedgerows which is **Significant** at a **Local Level**.

Ditches

Construction Phase Impacts

7.7.32 All ditches will be retained as part of the proposals and access will utilise existing land bridges and crossings. No new crossings will be required under the proposals and so habitat loss will not occur.

7.7.33 There is a risk that the existing ditch habitat may be damaged or degraded, through direct construction damage or indirect impacts through release of sediments or pollution deposition into the ditch network at the site which could flow into other ditches. Although pollution events are considered unlikely if they were to occur they could potentially have a detrimental effect affecting the quality of habitats on site and down-stream for the short-medium term. It should also be noted that a certain amount of dust deposition and runoff would be anticipated as a result of routine annual agricultural activities and as such effects are likely to be similar to the current baseline conditions.

Operation Phase Impacts

7.7.34 Operation of the site will require minimal input with only occasional maintenance visits expected. Most vehicles will utilise the access tracks and any disturbance to the ground is likely to be of a lower magnitude to that already caused through regular agricultural management practices.

7.7.35 The cessation of arable farming practices, including a subsequent reduction in spraying and application of fertiliser to the land, could result in the improvement of water quality with the ditches during periods of inundation.

Mitigation Measures

7.7.36 All ditches within the Site will be protected from damage and accidental pollution/runoff during construction by maintaining an undeveloped, naturally vegetated buffer. The buffer will be demarcated by perimeter deer fencing, or an appropriate alternative within the array, installed at the commencement of construction, at least 6m from the banks of these features.

7.7.37 Works compounds will not be sited within at least 20m of watercourses, and contingency measures for unforeseen incidents such as spillages will be set in place prior to the commencement of construction works. This will be prescribed as part of a CEMP and BPP.

7.7.38 The negative impacts of possible spoil deposition and runoff on the ditches to the site will be further mitigated by the implementation of the CEMP to be prepared for the Scheme. This will restrict working during periods of heavy rain and outline the installation of silt

fencing, if required. The CEMP will also set out best-practice pollution prevention guidelines to avoid/minimise the risks of pollution or sedimentation events occurring.

7.7.39 The BPP will also prescribe periodic monitoring of the condition of on-site ditches during construction with remedial measures taken where damage or degradation is identified.

7.7.40 During the operation phase, the ditches will be managed in order to maintain their drainage function and enhance their value for wildlife. Appropriate management of ditches will be prescribed via the LEMP.

7.7.41 Management will seek to prevent choking by vegetation, increase habitat diversity, and encourage settling of sediments and nutrient uptake by vegetation, whilst minimising disturbance to wildlife present. Management will be carried out on a rotational basis so that sufficient areas of refuge are retained in any one year of management.

Residual Effects

7.7.42 With pollution prevention measures in place, any unlikely pollution events can be mitigated and so the residual effect is considered **Not Significant.**

Species

Badgers

Construction Phase Impacts

7.7.43 Active badger setts have been identified in several locations around the site. The underground excavations associated with these setts may extend out into the construction zone. There is, therefore, some potential for damage to some of the tunnel network associated with setts. It should be noted that this would constitute an offence and as such mitigation measures will be applied to avoid these offences. In view of the legal requirements for the implementation of such mitigation, direct impacts on the sett without mitigation have not been assessed.

7.7.44 A small amount of disturbance may occur in terms of noise and vibration but this will be temporary in nature and would be a result of construction activities close to the setts.

7.7.45 During construction works, if deep trenches are left open overnight or high voltage machinery is present, there may be potential for incidental injury or mortality to badgers exploring the site during the night.

7.7.46 During the construction phase the availability and quality of foraging habitat will be adversely affected by the works. Although feasibly the entire approx. 57.5 ha of land expected to be within the development could represent badger foraging grounds, the temporary loss of habitats are anticipated to be similar in effect to the regular agricultural activities that take place on the site with the habitat becoming suitable for foraging badgers once works in a particular area are complete. Deer fencing erected at the project outset may restrict badger movements into the site.

Operation Phase Impacts

7.7.47 The cessation of intensive arable farming and expected reversion of land to grassland is likely to increase the value of the land within the array for foraging badgers, provided they have continued access to the site. In particular, the lack of disturbance (from

ploughing/harvesting etc.) and provision of year-round grassland foraging opportunities would represent better quality habitat than currently exists within the arable fields, which likely generally offer only seasonal foraging opportunities.

Mitigation Measures

7.7.48 Badger setts on the site are at risk of damage during construction works. Damage to setts will be avoided by provision of adequately protective exclusion zone around the sett(s) demarked either by site perimeter fencing, or by temporary, robust fencing with warning sign attached. The size of the buffer zones will be proportionate to the size and status of the setts, but will be at least 30m from the nearest entrance of the Main sett and at least 10m from the Annex and Outlying sett entrances. The 30m buffer zone around the Main sett is largely contiguous with the root protection area of a mature oak tree in the same area. As such, tree protection fencing would sufficiently protect the sett here. All contractors will be informed about the presence of the setts via a toolbox talk delivered by an ecologist prior to construction. No machinery will be driven within this buffer or materials stored in the area. This will be detailed within the BPP

7.7.49 A new access track is to be laid approximately 20m to the south of the Main badger sett, which falls within the prescribed 30m buffer zone. However, the track lies on the opposite side of a seasonally wet ditch from the sett in question. The sett excavations are highly unlikely to run underneath the ditch, and thus there is no risk of damaging the sett as result of laying the tracks. Disturbance impacts are also unlikely to occur when laying and using the track, particularly given the baseline level of disturbance from arable farming activities which take place in closer proximity. As best practice, initial works to lay the track within a 30m buffer of the main sett should commence prior to the main breeding season for badgers by commencing July to November, when any disturbance cause would have minimal consequences to the badger social group. This would enable badgers to habituate to construction prior to breeding. Once commenced activities can continue seasonally constrained.

7.7.50 Permanent or temporary exclusion of the outlying badger setts is not anticipated to be required. However, given that the outlying setts identified are of low status, in the event an exclusion was required it seems unlikely that the temporary or permanent loss of these setts would result in significant adverse impacts upon badgers. Clearly such exclusions would need to be undertaken via a Natural England development licence if required.

7.7.51 As badgers are able to quickly excavate new setts, the BPP will prescribe a pre-construction badger survey, to be undertaken no more than two months prior to construction commencing. The purpose of this survey will be to inspect for any new setts that may be impacted by the construction works, and ensure that appropriate action is taken to ensure compliance with current legislation if required.

7.7.52 The loss of foraging habitat for badgers during construction of the array will be a temporary impact. Badgers will still have access into the construction site and in view of the nature of development it is considered highly unlikely that all opportunities for foraging within the construction site will be 'lost'. Gaps of 100-150mm in height will be maintained beneath fencing for badger to dig under the fence; where necessary (e.g. where natural undulations in the ground do not allow) gaps will be created. Mammal gates will not be provided as these are generally ineffective and unnecessary given that deer fencing will not be buried

and badgers will be able to 'push under' the deer fence. As such it is not considered that the arrays will inhibit the free movement of badgers through the landscape.

7.7.53 The BPP will outline measures to be taken to reduce the probability of incidental mortality of badgers, including ensuring a method of escape is provided at any deep excavations which are left open overnight.

7.7.54 Implementation of the LEMP will ensure habitat of enhanced foraging quality for badger is provided within the operational Site.

Residual Effects

7.7.55 The above measures will reduce the minor negative effects on badgers during construction to neutral. Grassland management of the land within the array, delivered as part of the LEMP, will ensure this habitat represents suitable foraging grounds for the lifespan of the array, and residual effects will remain have an overall beneficial effect which is Not Significant.

Bats

Construction Phase Impacts

7.7.56 The hedgerows and woodland were considered to be of highest value for foraging and commuting bats using the site. These will be retained and protected throughout construction, ensuring bats are able to continue using these features with no disruption. The inor losses of hedgerow proposed are considered highly unlikely to significantly fragment foraging or commuting routes and unlikely to have an impact upon the favourable conservation status of bats present within the site.

7.7.57 The majority of bat species, particularly horseshoe, long-eared and Myotis species, will actively avoid lit areas due to the increased risk of predation. Artificial light can create a physical barrier to bat movement within the landscape. Several species including common and soprano pipistrelle (and occasionally serotine and noctule), however, will forage for insects attracted to white mercury streetlamps (i.e. those containing Ultra Violet [UV] elements). This is often to the detriment of other light sensitive bat species as insect food becomes scarcer in surrounding darker areas as a result. No significant lighting is expected to be required during the construction phase. However, during winter artificial lighting may be required within the construction zone due to the short day lengths. If this is the case, light may spill onto hedgerows and woodland. However, bat activity is much reduced during the winter months, and they are unlikely to be significantly affected in this case.

7.7.58 Five trees were identified during the initial visits which had some suitability for roosting bats. The trees will be retained and so no loss of potential roosting sites will occur. There may be some impact in terms of noise and vibration should bats be roosting within retained trees on the Site. This would occur during construction activities close to the trees/woodland. This disturbance would be temporary and effects are likely to be no greater than those associated with the usual agricultural activities which occur within the arable fields.

Operation Phase Impacts

7.7.59 The effects of solar array development on foraging/commuting bats is poorly understood; however, a study involving Clarkson & Woods[14], found that there was no statistically significant difference between bat activity recorded within solar farms when compared to similar undeveloped sites. A recently published paper[15] has concluded that bat activity was substantially reduced within solar arrays when compared to nearby farmland. However, the reasons for the apparent avoidance of the solar arrays by bats are unclear within the paper, and the weight able to be attached to the conclusions of the paper has been questioned due to study design factors and lack of clarity around some key factors[16], including the lack of comparable baseline data. The impact of solar arrays on foraging and commuting bats remains unclear.

7.7.60 Following the completion of the development and the establishment of a diverse grassland sward within the array and undeveloped field boundary buffer zones (which will be wider that existing uncultivated margins), the Site is likely to support a greater abundance and diversity of invertebrates, and therefore is likely to enhance foraging opportunities for bats within the Site.

7.7.61 No operational phase lighting will be necessary and thus bats would not be impacted by lighting during operation.

7.7.62 Approximately 2.7km of new, native and species-rich hedgerow planting is to be created at the Site. This will improve the ability of bats to navigate across the Site, as well as increasing foraging opportunities for this species group.

Mitigation Measures

7.7.63 A temporary reduction in the suitability of parts of the site for foraging bats during construction was noted but such effects are anticipated to be neutral upon the conservation status of bats within the area. The maintenance of the likely most important features at the site for foraging/commuting bats will mitigate for the temporary loss of suboptimal habitat across the arable fields.

7.7.64 As best practice and so as not to exclude light sensitive species from the Site or immediate surroundings, construction phase lighting will be sensitive to the surrounding environment as set out within the CEMP. Lighting will only be used where and when strictly required, and all luminaries will be directed toward the target area of works so that light spill does not impact surrounding areas. All lighting will be switched off at the end of the working day, and as such would generally be required during the winter months only. By adopting these measures, it is anticipated that lighting would not significantly adversely impact local bat populations.

Residual Effects

7.7.65 New hedgerow creation and grassland management within the array, delivered as part of the LEMP, will increase habitat quality for foraging bats for the lifespan of the array, although as reported above, preliminary research has so far not identified positive impacts of solar

[14] http://www.clarksonwoods.co.uk/projects/projects_solarresearch.html
[15] Tinsley E., Froidevaux J.S.P, Zsebők S., Szabadi K.L., and Jones G. (2023) Renewable energies and biodiversity: Impact of ground-mounted solar photovoltaic sites on bat activity. Journal of Applied Ecology, 60 (9), 1752-1762
[16] https://bsg-ecology.com/bats-and-solar-farms/

arrays on bats and it is possible that they are deterred from foraging within solar farms. Residual effects will remain be **Neutral** which is **Not Significant**.

Dormice

Construction Phase Impacts

7.7.66 Although records of dormice exist from the surrounding area, the hedgerows and woodland are considered suitable to support dormice if present.

7.7.67 In the absence of mitigation, there is the potential for impacts upon dormice to arise during the construction phase, through the inadvertent damaging of hedgerows and/or woodland edge habitats within the Site.

7.7.68 The removal of six relatively small (>5m) section of hedgerow would not be detrimental to the conservation status of this species; this represents a minor proportion of the suitable habitat on site, and no fragmentation impacts will occur as this width is significantly less than the minimum width across which dormice are known to cross[17]. However, in the absence of mitigation, there remains the potential for the clearance of discrete sections of hedgerow to result in the incidental killing and/or injury to individual dormice and damage to nests, should they be present.

Operation Phase Impacts

7.7.69 Operation of the site will require minimal input with only occasional maintenance visits expected. Most vehicles will utilise the access tracks and any disturbance is likely to be of a reduced level to that already caused through regular agricultural management practices.

7.7.70 Rotational management of hedgerows to improve structure (see 'Hedgerows' subheading above) may result in mortality or injury to dormice occupying hedgerows if not undertaken in a sensitive manner.

7.7.71 The proposed planting of approximately 2.7km of new, species-rich hedgerows will provide increased habitat extent and connectivity for dormice if present at the site.

Mitigation Measures

7.7.72 The most suitable habitat for dormice was the woodland and hedgerow networks; these will largely be protected by installing the deer fencing and internal fencing prior to construction commencing. The 4m resultant buffer zone will reduce any disturbance effects.

7.7.73 Incidental mortality of dormice may occur during construction should they be present within the short sections of hedgerow to be removed. In order to avoid this impact, a licensed ecologist will be present in a watching brief role during the removal of the hedgerow habitat. The hedgerow will be thoroughly searched for signs of dormice and the gateways will be created in locations where dormouse nests are confirmed absent and where dormice will not be affected. Specific working methods and timings will be detailed within the BPP as part of a non-licensable method statement. Works are not seasonally

17 Chanin P & Gubert L (2012) Common dormouse movements in a landscape fragmented by roads. Lutra 55 (1):3-15

constrained however removal of hedgerows outside the bird breeding season would avoid risks to delays (see 'Birds' subheading below).

Residual Effects

7.7.74 Assuming the successful protection of field boundary habitats and precautionary approach to minor hedgerow removal, no significant impacts on dormice are anticipated. Rotational hedgerow management during operation of the site will be sensitively timed to avoid inadvertently harming this species. A **neutral** residual effect is predicted, which is **Not Significant.**

Polecat

Construction Phase Impacts

7.7.75 Impacts upon polecat may arise from direct harm and mortality through movement of vehicles and clearance of habitat associated with widening of access gaps where necessary. Habitat degradation through pollution events may also occur, and disturbance during the construction period may also cause some temporary displacement of this species.

Operation Phase Impacts

7.7.76 Impacts on polecat during the operational phase are likely to be minimal, considering the adoption of ecological buffer zones and the restriction of development and vehicle movement to outside of these, save for habitat management operations.

7.7.77 The proposed planting of approximately 2.7km of new, species-rich hedgerows, as well as the provision of tussocky grassland habitat in undeveloped buffer zones, will provide increased habitat extent and connectivity for polecat.

Mitigation Measures

7.7.78 A precautionary approach to habitat clearance where gaps in field boundaries require widening can be prescribed as part of a BPP prepared for the Scheme. This would include sensitive methods and timing of clearance, the attendance of an ecologist in a watching brief role where necessary.

Residual Effects

7.7.79 Assuming the successful protection of field boundary habitats and precautionary approach to minor hedgerow removal, no significant impacts on dormice are anticipated. A neutral residual effect is predicted, which is **Not Significant**.

Reptiles

Construction Phase Impacts

7.7.80 Impacts upon this species group might comprise direct harm, habitat degradation and habitat loss during clearance of hedgerows or other field boundary habitats required for permanent/temporary construction and maintenance access or cable trenching. Where

limited numbers of breaches for Site access are required, some minor temporary habitat loss will occur.

Operation Phase Impacts

7.7.81 Operation of the site will require minimal input with only occasional maintenance visits expected. Most vehicles will utilise the access tracks and any disturbance is likely to be of a reduced level to that already caused through regular agricultural management practices

7.7.82 The provision of generous ecological buffer zones alongside field boundaries during operation of the Site, measuring wider than existing field margins, and managed to form for tussocky grassland, will maintain and in many cases enhance the habitat availability for reptiles.

Mitigation Measures

7.7.83 A precautionary approach to habitat clearance where gaps in field boundaries require widening can be prescribed as part of a BPP prepared for the Scheme. This would include sensitive methods and timing of clearance, and the attendance of an ecologist in a watching brief role where necessary.

Residual Effects

7.7.84 It is considered reasonably likely that habitat enhancement measures, in conjunction with the favorable management of buffer zones which are considerably larger than current field margins, would result in a beneficial effect for reptiles. This would be a positive though **Non-Significant** effect.

Birds – of Open Farmland

Construction Phase Impacts

7.7.85 Approximately 4-5 skylark territories were recorded within the open arable fields during breeding bird surveys undertaken at the site.

7.7.86 Habitat for ground nesting birds would be lost during site clearance and construction activities. Furthermore, these species need to monitor surrounding habitat for potential predators, and as a result, the site is unlikely to offer suitable habitat for nesting post development given the presence of panels which would disrupt sightlines.

7.7.87 There is evidence which indicates that solar arrays provide valuable foraging habitat for birds, including skylarks and other ground nesting birds. Skylarks have been recorded using land within solar arrays for nesting and for foraging. A preliminary study co-authored by Clarkson and Woods ecologists identified skylarks using land within solar arrays for foraging during the summer months, at comparative (and sometime higher) levels to that of control sites[18].Other incidental observations of skylarks foraging within solar arrays have been recorded by Clarkson and Woods ecologists whilst undertaking monitoring of solar arrays on various sites around the country. In almost every site monitored (Clarkson and Woods have monitored in excess of 100 large scale solar arrays) skylark have been seen foraging within or perching on array panels. Furthermore, Clarkson and Woods have identified likely

18 Montag, H, Parker, G & Clarkson, T. (2016) The Effects of Solar Farms on Local Biodiveristy: A Comparative Study.

skylark nests within arrays in large, undeveloped areas where panels have not been installed (such as easements or wide field margins of >50m).

7.7.88 It is noted that there is an abundance of open, arable farmland within the surrounding 5km, which would be expected to absorb a proportion of the breeding skylark population that would be displaced from the site, although specific information on farming practices and timings for this land is unknown.

7.7.89 There lies potential for incidental injury or mortality to adults, young and eggs as a result of construction activities, or disturbance causing adults to abandon the nests, should construction take place during the breeding season.

Operation Phase Impacts

7.7.90 The impact of loss of habitat for ground nesting birds is assessed as part of the construction of the array. There will be no further habitat loss for this feature during the operation of the array, and operational site maintenance will result in minimal disturbance. The cessation of intensive arable farming practices (particularly insecticide spraying) and reversion of the land to permanent (for at least the duration of the array) grassland can be expected to result in increased numbers and diversity of foraging resources for ground nesting birds, such as invertebrates and some seed bearing plant species.

Mitigation Measures

7.7.91 In order to avoid the effects of disturbance and mortality as far as possible, Following the last harvest prior to construction and prior to the 1st March, all vegetation within the construction zone in the arable fields will be cut to ground level to discourage ground nesting birds from beginning nest building. This vegetation will be kept below 100mm until construction commences through regular management as appropriate. Should vegetation be over 100mm when construction commences, a qualified ecologist will conduct a nesting bird check. In the event that vegetation has grown to a height of over 100mm at the beginning of construction in any of the fields (during key bird besting season of March to August inclusive), a pre-construction site inspection by an ecologist would be required to ensure that no nesting birds are present. In the unlikely event that nesting birds are found despite the above mitigation, no works will occur within a suitable buffer (minimum 50m radius) around the nest until an ecologist has confirmed that the chicks have fledged. This will minimise the risk of damaging nests of ground nesting birds.

7.7.92 The lack of regular disturbance of land within the array site will help to ensure those birds that nest within both the array and the retained open areas are more likely to successfully rear broods without risk of damage by agricultural activity.

7.7.93 Foraging behavior displayed by ground nesting bird species has been regularly observed within solar arrays by Clarkson and Woods, and therefore the increase in quality of foraging within the array, to be delivered via the LEMP, will be expected to an increased success of brood rearing at any nests within the site as well as within the nearby landscape off-site. As such, the adverse effects identified upon ground nesting birds can be reduced with the mitigation measures proposed.

Residual Effects

7.7.94 The impact of direct mortality on ground nesting birds will be mitigated by manipulating the habitat prior to and during the breeding season to discourage birds from nesting prior to commencing on site. The improvement in habitat quality for foraging birds would also

be expected to boost the breeding success rates of birds nesting within surrounding farmland.

7.7.95 Although a residual detrimental impact is expected on skylarks , primarily due to loss of nesting habitat, the mitigation proposed is expected to reduce this effect to **Non-Significant** levels.

Birds - Other

Construction Phase Impacts

7.7.96 Four bird species of conservation concern (yellowhammer, linnet, song thrush and dunnock) were recorded using boundary habitats for breeding and there is the potential for indirect impacts on these species during construction works. The disturbance from noise and vibration may deter species from nesting close to the construction area or, as a worst case, cause abandonment of nests. This is considered unlikely as the birds will be habituated to some level of disturbance from agricultural machinery and the most disturbing construction activities (piling steel frames and digging trenches) will occur some way from hedgerows (at least 10m) and will be of short duration.

7.7.97 There is also the unlikely potential for construction vehicles to damage boundary features, or for this habitat to be degraded through dust or runoff (as discussed within the Hedgerows & Woodland sections above). This may affect the suitability of this habitat for nesting and may cause damage to any active nests.

7.7.98 Where small (<5m wide) sections of hedgerow may require removal for new access, there is the potential to destroy nests or cause mortality to birds. The loss of an over small area (<25m in total) of habitat for breeding birds will not significantly affect foraging or breeding habitat availability.

Operation Phase Impacts

7.7.99 The operational scheme will require minimal upkeep and any disturbance effects from maintenance works are likely to be of a low severity in line with those already present due to agricultural management practices. The cessation of intensive arable farming practices (particularly insecticide spraying) and reversion of the land to permanent (for at least the duration of the array) grassland can be expected to result in increased numbers and diversity of foraging resources for breeding birds, including invertebrates and some seed bearing plant species. These bird species are also likely to benefit from the presence of structures for perching and cover provided by the solar panels as has been recorded at other solar arrays[19].

7.7.100 The reversion of land beneath the panels from arable to low-intensity sheep grazed grassland is expected to boost the abundance of small mammals, which would increase

[19] Montag, H, Parker, G & Clarkson, T. (2016) The Effects of Solar Farms on Local Biodiversity: A Comparative Study.

the foraging value of the site for birds of prey which could use the site, such as barn owl *Tyto alba*.

7.7.101 Approximately 2.7km of new, native hedgerow planting is to be created at the site. This will greatly increase the foraging and nesting habitat available for bird species which use this habitat.

Mitigation Measures

7.7.102 An undeveloped buffer of at least 4m will be maintained from all boundary features, to be delineated using deer or temporary fencing. This buffer will be larger alongside woodland areas. This will prevent damage to this habitat during construction. Details to protect these features are outlined within the CEMP.

7.7.103 Should the removal of sections of hedgerow be required during the main nesting season (March to August inclusive, these will first be subject to a nesting bird check by an experienced ecologist no more than 48hrs prior to the work being done to ensure no active birds nests are present. If active nests are found, these will be monitored until fledging and the works delayed until this time. These can be prescribed as part of the BPP prepared for the site.

7.7.104 Implementation of the LEMP will ensure the value of new/retained habitats for breeding birds is realised in the long-term.

Residual Effects

7.7.105 Very few detrimental impacts are likely to occur both during construction and operation on birds breeding within the boundary features. With appropriate mitigation in place, as well as the expected increase in foraging value of the site and new nesting opportunities within the hedgerow, a residual beneficial impact is expected, which is **Significant at a Local scale.**

Invertebrates

Construction Phase Impacts

7.7.106 The arable habitat to be lost did not offer habitat of elevated value for invertebrate assemblages so there will be very few impacts resulting from habitat loss for this feature. However, if plant species associated with arable margin habitat is removed from the site, this will adversely impact species which are regularly associated with these plants.

7.7.107 Construction activities may result in dust/sediment deposition leading to degradation of the varied habitats at the field boundaries, including woodland, hedgerows, and aquatic habitats, which were considered to the most value habitats for invertebrates. Effects of this are only likely to be temporary, although could end up being felt in the long-term if aquatic habitats are seriously affected.

Operation Phase Impacts

7.7.108 The cessation of intensive arable farming practices (particularly insecticide spraying) and reversion of the land to permanent (for at least the duration of the array) grassland can be expected to result in increased diversity and numbers and diversity of invertebrates at the

site. This includes a number of pollinating of butterfly and bee species[20] which have been shown to have increased diversity and abundance in solar arrays compared to control plots. Given the large extent of habitat that will likely increase in quality, the operational impacts of the development will have beneficial effects on a range of invertebrates. The Site lies within a Buglife 'B-Line', and therefore providing new and enhanced habitat for a range of pollinating insects will contribute to this national scale approach to conserving pollinators.

7.7.109 The anticipated change of land use from the existing arable habitat underneath the array to grassland subject to minimal disturbance will be expected to lead to an increase in the quality of the habitats across the site for a range of invertebrate species, particularly due to the cessation in spraying of crops.

Mitigation Measures

7.7.110 The mitigation measures set out to protect the key habitats for invertebrates, including hedgerows, woodland and ditches, will ensure these features are protected from damage and degradation during construction, and will lead to a residual Neutral effect on the key invertebrate assemblages using the site.

7.7.111 During the operation of the array, the change of land use from the existing arable habitat underneath the array to grassland subject to minimal disturbance and managed under the LEMP will lead to an increase in the quality of the habitats across the site for invertebrates, particularly due to the cessation in spraying of crops.

Residual Effects

7.7.112 Very few detrimental impacts are likely to occur impacts are likely to occur both during construction and operation on invertebrates within the boundary features. With the expected increase in value of the site as a result of cessation of arable farming activities, a residual beneficial impact is expected, which is **Significant** at a **Local** scale.

[20] Montag, H, Parker, G & Clarkson, T. (2016) The Effects of Solar Farms on Local Biodiversity: A Comparative Study.

Table 7.4: Residual Effects Summary

IEF	Value	Phase	Mitigation Measures	Residual Effects	Significance
Thames at Cherwell and Oxford CTA	County	Construction	Implementation of protection measures and buffer zones, precautionary working methods prescribed via CEMP/BPP	Neutral	Not Significant
		Operation	No adverse effects and no specific mitigation required or proposed Cessation of intensive arable farming	Positive	Not Significant
Thames Radley to Abingdon CTA	County	Construction	Implementation of protection measures and buffer zones, and precautionary working methods prescribed via CEMP/BPP	Neutral	Not Significant
		Operation	No adverse effects and no specific mitigation required or proposed Cessation of intensive arable farming	Positive	Not Significant
Broadleaved Plantation Woodland	Local	Construction	Protection of woodland including adequate fenced buffer zones. Implementation of CEMP/BPP	Neutral	Not Significant
		Operation	No adverse effects and no specific mitigation required or proposed Cessation of intensive arable farming	Positive	Not Significant

IEF	Value	Phase	Mitigation Measures	Residual Effects	Significance
Hedgerows and Line of Trees	Local	Construction	Protection of hedgerows including adequate fenced buffer zones. Implementation of CEMP/BPP	Neutral	Not Significant
		Operation	Creation and management of retained and new (circa 2.7km) habitat via LEMP Cessation of intensive arable practices	Positive	**Significant at Local Level**
Ditches	Local	Construction	Implementation of protection measures and buffer zones, and precautionary working methods prescribed via CEMP/BPP	Neutral	Not Significant
		Operation	Rotational management of ditches via LEMP	Positive	Not Significant
Badgers	Site	Construction	Protection of setts through implementation of adequate buffer zones. Ensure badgers are able to continue to use the construction site. Implementation of BPP	Neutral	Not Significant
		Operation	Management of new and retained habitat via LEMP	Positive	Not Significant
Bats	Local	Construction	Retention of highest value foraging habitats (hedgerows, lines of trees, woodland) and adoption of protective measure via CEMP/BPP	Neutral	Not Significant
		Operation	Management of new and retained habitat via LEMP	Neutral	Not Significant

IEF	Value	Phase	Mitigation Measures	Residual Effects	Significance
Dormice	District (if present)	Construction	Retention of suitable habitat and adoption of hedgerow/woodland protection measures, and sensitive clearance of small section of hedgerow as part of a BPP.	Neutral	Not Significant
		Operation	Creation of new hedgerow habitat, and management of retained and new habitat via LEMP	Positive	Not Significant
Polecat	Local (if present)	Construction	Protect key features through implementation of fenced buffer zones at boundary habitats, precautionary approach to clearance at field boundaries. Delivered via CEMP/BPP	Neutral	Not Significant
		Operation	Management of new and retained habitat via LEMP	Positive	Not Significant
Reptiles	Site (if present)	Construction	Protect key features through implementation of fenced buffer zones at boundary habitats, precautionary approach to clearance at field boundaries. Delivered via CEMP/BPP	Neutral	Not Significant
		Operation	Management of new and retained habitat via LEMP	Positive	Not Significant
Birds of Open Farmland	Local	Construction	Maintenance of habitat as unsuitable for ground nesting birds prior to, and during, construction.	Adverse	Not Significant
		Operation	Management of retained and new foraging habitat via LEMP	Neutral	Not Significant

IEF	Value	Phase	Mitigation Measures	Residual Effects	Significance
Birds - Other	Local	Construction	Timing habitat clearance to avoid nesting birds. Protect key features through implementation of fenced buffer zones at boundary habitats, delivered via CEMP/BPP	Neutral	Not Significant
		Operation	Management of new and retained habitat via LEMP	Positive	**Significant at Local Level**
Invertebrates	Local	Construction	Protect key features through implementation of fenced buffer zones at boundary habitats, delivered via CEMP/BPP	Neutral	Not Significant
		Operation	Management of new and retained habitat via LEMP	Positive	**Significant at Local Level**

7.8 Enhancements

7.8.1 The scheme will deliver a range of ecological enhancements intended to benefit a variety of features important for nature conservation, including, but not limited to, several of the IEFs.

7.8.2 These enhancements will be designed to deliver additional ecological benefits beyond those expected to occur as a result of the mitigation measures and scheme design described above.

7.8.3 10 long lasting bat roosting features will be installed on suitably mature trees within and adjacent to the site to increase the roosting opportunities available for birds. A variety of boxes are commercially available and will be adopted in order to attract the different species of bats recorded using the site. These will be maintained for at least the duration of the array. The specification and locations of bat boxes will be detailed within the LEMP prepared for the scheme.

7.8.4 12 long-lasting bird boxes designed to attract a range of bird species of conservation concern will be installed on suitably mature trees within and adjacent to the site. This will enhance the sites' value for breeding birds which occupy boxes and holes in trees. These will be maintained for at least the duration of the array. The specification and locations of bird boxes will be detailed within the LEMP prepared for the scheme.

7.8.5 5 dormouse nesting boxes will be installed on suitably mature trees within the hedgerow and woodland network on site. This will boost opportunities for dormice to successfully breed at the site (if present). Dormouse boxes are known to be used by other wildlife species, including nesting birds (such as blue tits) and roosting bats, so may also enhance the site for birds and bats if dormice are not currently present. The specification and locations of dormouse boxes will be detailed within the LEMP prepared for the scheme.

7.8.6 At least 5 hibernacula / log piles to provide refuges for reptiles, small mammals and invertebrates will be constructed within buffer zones between the site perimeter fencing and the nearest field boundary.

7.8.7 Details of the creation/installation of ecological enhancement and prescriptions for the long-term management and maintenance will be described within the LEMP prepared for the site.

7.9 Decommissioning

7.9.1 Decommissioning of the site would be expected to have similar direct effects as those described in the construction phase impacts for each receptor. Removal of solar panel frames, underground cabling, substations and concrete footings, access and battery energy storage would have similar effects as installation of these features, and comparable levels of disturbance from movement of vehicles and personnel would be expected.

7.9.2 The restoration of the land to open arable farmland would likely be beneficial for some species of farmland bird which require open sightlines, but much of the biodiversity value which it is anticipated will develop would be lost along with habitat for a variety of other

species. In order to revert back to arable food production, in may be necessary to enhance the nutrient content of the soil if it has been depleted, which would likely be achieved through treatment with fertilisers. An increase in the use of pesticides and herbicides would also be expected.

7.9.3 Depending on the ecological value of the habitats that develop over the lifespan of the scheme, it is possible that certain areas of the site may need to be retained due to their value for wildlife on decommissioning. Alternatively, and on application of the ecological mitigation hierarchy principles (i.e. avoidance-mitigation-compensation as per CIEEM guidance[21]), their loss may require compensation through on or off-site measures to ensure land/habitats are preserved for wildlife into the future.

7.9.4 No more than twelve months prior to decommissioning commencing, the site will be visited by an appropriately qualified ecologist to identify any ecological constraints arising from decommissioning activities. Further surveys, mitigation and/or compensatory measures may then be required. As a minimum, an extended Phase 1 Habitat survey (or equivalent) will be required to identify the potential presence of protected species and important habitats.

7.9.5 Based upon current (2024) legislative protection, protected species which could be directly impacted by decommissioning activities would include badgers, reptiles and breeding birds. Further surveys to identify the use of the site by these receptors would therefore also be expected as a minimum.

7.9.6 Any mitigation measures undertaken at the point of decommissioning aimed at maintaining ecological value of the site should take account of changes in ecological objectives that have occurred over the lifespan of the array and battery energy storage elements. In particular, changes in ecological conditions both on the site and on a national scale as a result of climate change may result in new ecological objectives that cannot at the current time be reasonably foreseen.

7.10 Cumulative and In-Combination Effects

7.10.1 One other ground-mounted solar development was identified as having potential to result in cumulative impacts on IEFs identified at the site. This is South Oxfordshire Solar Farm, which has been approved by the LPA (South Oxfordshire Planning Reference: P20/S4360/FUL). This lies on the opposite side of the A4074 immediately to the east of the Application Site.

7.10.2 With the ES chapter prepared for South Oxfordshire Solar Farm, potential impacts on farmland birds (namely skylark) were identified, with an estimated 10 skylark territories recorded during breeding bird surveys. It is likely the same local population of skylark utilise both Sites for breeding and foraging. The ES prepared for the South Oxfordshire site sets out how the reduction in available nesting habitat for skylark will be balanced with the likely increase in habitat quality for foraging. The design of this site also includes undeveloped 'Skylark Mitigation Areas' designed to offer continued nesting habitat for skylarks as mitigation measures, and concluded no significant impacts on skylarks will occur. As such

[21] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM, Winchester

no cumulative impact impacts are considered likely on this feature, although this depends on the success of management.

Cessation of intensive farming is often an inherent beneficial ecological impact of solar farm developments, resulting in more diverse grassland swards and associated invertebrates with their predatory species across a range of wildlife taxa. Thes developments may therefore have landscape-scale cumulative beneficial effects for a wide range of species.

7.11 Conclusions

7.11.1 With the successful implementation of the mitigation measures described above, any adverse effects upon the important ecological features identified will be reduced to a non-significant level.

7.11.2 The creation of new habitats of greater biodiversity value than the current habitats within the site and the implementation of the LEMP present the opportunity to enhance the biodiversity value of the area. As such, it is anticipated that during the operational phase the development will result in a moderate beneficial enhancement due to the change of use from agricultural land to a more biodiverse grassland with enhanced hedgerow network.