Chapter 12

BIODIVERSITY

12 Biodiversity

Preface

This ES chapter has been updated to reflect the following:

- Updated to legislative and policy context;
- Updated baseline conditions information to reflect baseline surveys undertaken in 2023 and 2024;
- Updated assessment of ecological impacts based on the above;
- Updated assessment of ecological impacts based on updated operational air quality modelling (as presented in Chapter 9: Air Quality and Appendix 9.8: Biodiversity Air Quality Modelling Assessment); and
- Revised biodiversity net gain assessments which reflect the statutory biodiversity metric published in 2024.

12.1 Introduction

12.1.1 This chapter of the ES was prepared by Tyler Grange Group Ltd. and presents an assessment of the likely significant effects of the Development on biodiversity. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and/or enhance likely beneficial effects. The nature and significance of the likely residual effects are reported.

12.1.2 The chapter is supported by the following appendices:

- Appendix 12.1: Legislation and Planning Policy;
- Appendix 12.2: Protected Species Survey Methodology and Results;
- Appendix 12.3a: Biodiversity Net Gain Assessment, Eastern Site;
- Appendix 12.3b: Biodiversity Net Gain Assessment, Western Site;
- Appendix 12.3c: Onsite Post-intervention BNG Plan;
- Appendix 12.3d: Offsite Post-intervention BNG Plan;
- Appendix 12.4: Habitat Features, Badger and Preliminary Bat Roost Assessment Plan;
- Appendix 12.5: Designated sites and Ancient Woodland Plan;
- Appendix 12.6: Bat Survey Location Plan;
- Appendix 12.7: Bat Activity Transect Survey Results Plan;
- Appendix 12.8: Breeding Bird Survey Results Plan; and
- Appendix 12.9: Hazel Dormouse Survey Results Plan.

Competence

12.1.3 Amber Perrett BSc MCIEEM is the principal author of this chapter of the ES. She has over six years' experience in the environmental sector. Her experience includes logistics/commercial

schemes, as well as contributing to the ecological and biodiversity input into the ES chapters for nationally significant infrastructure projects. Julian Arthur CEcol MCIEEM CEnv is the reviewer of this chapter of the ES. He has over 25 years' experience in the environmental and EIA sector, including experience on logistics/commercial projects.

12.2 Legislation, Planning Policy and Guidance

Legislation Context

12.2.1 Specific habitats and species receive legal protection in the UK under the following pieces of legislation (with more detail contained in Appendix 12.1):

- The Wildlife and Countryside Act 1981 (as amended)[1];
- The Environment Act 2021[2];
- The Conservation of Habitats & Species Regulations 2017 (the 'Habitats Regulations')[3];
- The Countryside and Rights of Way Act 2000[4];
- The Protection of Badgers Act 1992[5];
- The Hedgerows Regulations 1997[6];
- The Natural Environment and Rural Communities (NERC) Act 2006[7]; and
- The Wild Mammals (Protection) Act 1996[8].

12.2.2 Where relevant, the assessment takes account of this legislative protection.

Planning Policy Context

National

12.2.3 The following national planning policy is relevant to the Development:

- The National Planning Policy Framework 2023[9] ('NPPF').

Local

12.2.4 The following local planning policy is relevant to the Development:

- Cherwell Local Plan 2011 - 2031 Part 1 Partial Review, Adopted September 2020[10];
- Cherwell Local Plan 2011 - 2031 Part 1, Re-adopted December 2016[11];
- Cherwell Local Plan Review 2024 Consultation Draft (Regulation 18) September 2023[12];
- Oxfordshire Biodiversity Action Plan[13]; and
- Cherwell Corporate Biodiversity Action Plan 2016-18[14].

Guidance

12.2.5 The following guidance is relevant to the assessment:

- BS 42020:2013. Biodiversity – Code of practice for planning and development[15];
- BS 5837:2012. Trees in relation to design, demolition and construction, recommendations[16];
- CIEEM Guidelines for Ecological Impact Assessment in the United Kingdom, Ireland: Terrestrial, Freshwater, Coastal and Marine (the 'CIEEM Guidelines')[17]; and

- CIEEM (2023) Advice on Ecological Assessment of Air Quality Impacts, Version 2. Chartered Institute of Ecology and Environmental Management[18].

12.3 Assessment Methodology

Consultation

12.3.1 Table 12.1 summarises key comments raised by consultees of relevance to this assessment and how the assessment has responded to them.

Table 12.1: Consultation Response Summary

Consultee and Comment	Response
Cherwell District Council (CDC) EIA Scoping Opinion, Planning and Development team, 29th July 2021	
'*The approach to this topic is agreed as this is relatively standard, i.e. CIEEM's Guidelines for Ecological Impact Assessment version 1.1 (updated September 2019).'* *'The report does not mention ecological enhancements beyond mitigation, and this should be included particularly if compensatory habitats or contributions are likely to be required in order to achieve the required net gains for biodiversity. A Biodiversity Impact Assessment tool should be included and discussed.* *The cumulative impact assessment should include consideration of how the green infrastructure and any wildlife corridors will complement those of nearby developments*.' '*Include and discuss A Biodiversity Impact Assessment tool within this chapter*'. Telephone conversation with CDC on 20th July 2021.	A biodiversity net gain assessment using the Defra Statutory Biodiversity Net Gain (BNG) Metric calculation tool is provided in Appendix 12.3a and 12.3b for the Eastern Site and Western Site respectively.The findings are summarised in the this chapter. Enhancement measures are included within the metric as appropriate to ensure a net gain is achieved. The ecologist from CDC confirmed that it will be acceptable to offset any deficit in biodiversity units from the Development off-site provided the land is within CDC's jurisdiction.
Campaign for the Rural Environment (CPRE) (Oxfordshire), EIA Scoping Opinion, 23rd July 2021	
'*It is essential that biodiversity assessments and calculations of loss are given in full in the ES to comply with the industry-standard best practice principles for transparency and sharing of calculations as requested by the CIEEM as well as suitable mitigation of losses.*' 'The *Baseline biodiversity data did not appear to include a survey of invertebrates which is required especially as the LP Policy ESD10,*	A biodiversity net gain assessment using the Defra Statutory BNG Metric calculation tool is provided in Appendix 12.3a and 12.3b for the Eastern Site and Western Site respectively. The findings are summarised in this chapter. Given that the majority of hedgerows within the Site will be retained (see Parameter Plans TP10 and TP4: Vegetation Retention and Removal), targeted brown hairstreak survey was not considered necessary. Replacement planting is

Consultee and Comment	Response
para 237, requests that surveys of the brown hairstreak butterfly are performed for all developments around the Bicester area.'	proposed in close proximity to the locations of proposed hedgerow removal on the northern boundaries of the Site which is considered to sufficiently compensate for any loss in potential brown hairstreak habitat.
Fritwell Parish Council, EIA scoping opinion, July 2021	
'*Provide with further details of how and where in the locality the habitat loss will be compensated for by habitat creation and enhancement*.'	A BNG Assessment using the Defra Statutory BNG Metric calculation tool is provided in Appendix 12.3a and 12.3b for the Eastern Site and Western Site respectively. The findings are summarised in this chapter. Land Use Parameter Plans (TP002 - Western Development and TP 008- Eastern Development) define an Existing and Enhanced Areas of Landscape Zone which is an area designated for retention and strengthening of existing vegetation. As set in Chapter 5, the Applicant has obtained approximately 20ha of arable land at Piddington, south east of Bicester to deliver off-site BNG. Following implementation of both on-site and off-site habitat creation and enhancement, it is anticipated that the Development will be able to achieve a net gain of over 10%. This will be secured through the Section 106 Agreement.
Natural England 23rd June 2022	
'*No Objection* *Based on the plans submitted, Natural England considers that the proposed development will not have significant adverse impacts on designated sites and has no objection.'*	No response required.
Campaign for the Protection of Rural England (CPRE) 21st November 2021	
'*The biodiversity net gain (BNG) calculation shows that there will be a significant impact on the surrounding environment with a significant loss of on site biodiversity which can only be mitigated off site*.'	In line with planning policy, a biodiversity net gain of at least 10% will be achieved for both the Eastern Site and Western Site through a combination of on-site and off-site measures.
'CPRE have several concerns with the impact that this development will have on the local environment and specifically around the loss of local biodiversity. The biodiversity net gain (BNG) calculation shows a significant loss of on site biodiversity. The plan is that this will be mitigated at Piddington some 10 miles away from the development on a site owned by the developer.	The Development seeks to maximise the net gain in biodiversity units within the site as far as possible whilst ensuring the viability of the Development. Landscape proposals would be delivered within the Site which includes the creation of habitats of ecological value such as neutral grassland, woodland and scrub habitats in addition to tree planting. The provision of off-site compensation measures at another location

Consultee and Comment	Response
Every attempt should be made to secure gains in biodiversity that are close as possible to the development site. The developer should be able to demonstrate that they have followed an offsetting hierarchy which is to avoid harm, minimise impacts by design or effective mitigation, compensate on site to provide equivalent or better and then finally achieve gains off site. There is no evidence that this mitigation hierarchy has been followed. *Whilst a bng has been provided for the Piddington site, there is no detail underpinning this so no realistic assessment can be made as to whether it is achievable. CPRE contends that the suitability of this site needs to be considered as part of this application and not shunted to a reserved matter consideration as suggested by the developer. The Environment Agency has already flagged that the mitigation site lies within an area at risk of flooding. Given that the local plan refresh has called for sites, has the Piddington site been submitted as protected green space?'*	within CDC was verbally confirmed as acceptable with CDC prior to submission. Off-site habitat creation and enhancement is an accepted method of securing BNG as set out within Defra's BNG guidance and described within Schedule 14 of the Environment Act 2021. A BNG Assessment has been prepared for the Eastern Site and Western Sites (Appendix 12.3a and 12.b) which shows net gain of 10% for habitat units and 11% for hedgerow units for the Eastern Site and 16% for habitat units and 11% for hedgerow units for the Western Site. A large proportion of the total post-development habitat units are obtained from within the Site along with the measures that would be delivered at a site at Piddington which is under the Applicant's control. The proposed off-site habitat enhancement includes the creation of neutral grassland (comprising grassland with a high proportion of flowering grasses) and hedgerows. For the avoidance of doubt, the proposed works do not comprise development and therefore do not require planning permission. However these proposals would be secured through legal agreement. A Habitat Management and Monitoring Plan (HMMP) will also be prepared and submitted to CDC prior to commencement of the Development. HMMP will describe measures to maximise the biodiversity potential of retained and newly created habitats through appropriate management and will cover a period of 30 years.
'*The developer should show that the site in Piddington will provide the complementary habitat and green corridors that will be lost to Baynards Green. Policy ESD 10 (para B236) reiterates this by stressing the importance of areas adjacent to sites in providing important linkages to enable nature to thrive. CPRE are concerned that this development will lead to habitat fragmentation as hedges and trees are displaced or moved and the impacts of these do not appear to have been properly assessed in the developer's ecology submission in their ES. Furthermore there does not appear to be an assessment of the*	The proposed off-site habitat enhancement (at land at Piddington, which is under the Applicant's control, includes the creation of neutral grassland (comprising grassland with a high proportion of flowering grasses) and hedgerows. It is also important to note that the hedgerows which will be removed from the Site are all defunct species-poor hedgerows which contain large gaps and are not well-connected to the boundary hedgerows or the wider landscape. Therefore, removal of these defunct, species-poor internal hedgerows is not anticipated to fragment ecological networks. The species-rich

Consultee and Comment	Response
impacts of the development on Stoke Wood Wildlife site'	hedgerows around the boundaries of the Site are to be maintained except for sections on the northern boundaries to facilitate access points. Replacement hedgerow planting will be completed as close to these areas as possible, thereby maintaining habitat connectivity around the boundaries of the site as far as possible. Tree and shrub planting is also proposed to provide additional vegetation around the boundaries of the Site. Potential impacts upon Stoke Wood LWS are assessed within the 'non-statutory designated sites' sections of this chapter. This LWS is located approximately 320m south of the Site at the closest point and no tangible impact pathways were identified: No habitat loss within the LWS will occur as a result of the Development; The LWS is beyond the distance typically considered for air quality impacts (200m) or lighting and noise effects; no recreational impacts are anticipated due to the commercial nature of the Development and there are no likely significant effects are anticipated. No likely significant effects are assessed on Stoke Wood LWS.
'*Policy ESD10 states that planning applications should include surveys where there are species of known ecological value. It is acknowledged by the developer that the current habitat supports farmland birds. Some of these such as the yellowhammer are on the red list, which is the highest conservation priority needing urgent action. CPRE do not believe that there is any justification for not undertaking relevant surveys in this instance. How can an informed decision be made about the habitat required off site if there is not clarity on what is being displaced on site.*'	Breeding bird surveys have been completed at the Site and are reported in Appendix. The Site is considered likely to support a small breeding assemblage of farmland birds. Grassland and hedgerow habitat provision off-site at Piddington is considered likely to provide alternative, enhanced habitat for birds that may be utilise habitats within the district, including skylark, yellowhammer and linnet. The off-site land at Piddington would be managed to provide a substantial area of habitat that can be managed optimally for farmland birds and is considered likely to be of a higher quality than the largely arable land that is being lost.
'*The developer states that surveys for the brown hairstreak butterfly are not needed in this instance. This runs counter to policy ESD10 para B237 in the Local Plan which requires developments to provide surveys of the brown hairstreak butterfly with no caveats such as whether habitat exists to support it. Indeed, the site does appear to have suitable*	The majority of hedgerows within the Site will be retained as secured by the Parameter Plans TP10 and TP4: Vegetation Retention and Removal), and the internal hedgerows to be removed are defunct, species-poor hedgerows, targeted brown hairstreak survey is not considered necessary. Replacement planting is proposed in close proximity to the locations of

Consultee and Comment	Response
habitat on site such as hedgerow with blackthorn. For other species bats surveys appear incomplete and no surveys have been completed for dormice, even though the developer's ecologist indicates that there may be habitat on site that can support these species.'	proposed hedgerow removal on the northern boundaries of the Site which is considered to sufficiently compensate for any loss in potential brown hairstreak habitat. Therefore no likely significant effects are anticipated in relation to brown hairstreak butterfly. Hazel dormouse surveys were completed at the Site in 2022 and no evidence of their presence was identified at the Eastern Site. Evidence of hazel dormouse was identified in boundary hedgerows at the Western Site. Given that these boundary hedgerows will predominantly be retained and replacement planting will be completed in close proximity to locations of hedgerow removal on the northern boundaries of the Site, it is considered that there would be no likely significant effect on hazel dormouse and no further survey is necessary. Additional hedgerows will be planted at Piddington, creating further habitat opportunities for hazel dormouse within the district.
Tusmore Park Estate, 21st February 2022	
'We note that as part of its planning applications, Albion Land have proposed details of Biodiversity Net Gain (BNG) and, in order to accommodate a BNG, an area of off-site habitat compensation will be created, comprising approximately 20ha of arable land located in Piddington, south east of Bicester. *We object to these proposals on the basis that the area of land proposed for BNG is approximately 13km from the proposed development sites and is, therefore, in no way functionally related in biodiversity terms to the development site. The surrounding land to the north and east of the proposed development sites are designated as 'Conservation Target Areas' in the Local Plan. Our view is that the documentation submitted with the planning application does not sufficiently address suitable ecological mitigation and biodiversity net gain that would help towards preserve the surrounding area and ecological designations. The proposals, therefore, are not in accordance with Policies ESD10 and ESD11 of the Local Plan. It is also noteworthy that the*	The Applicant has committed to achieving a minimum BNG of at least 10% in line with planning policy and statutory requirements. Appendix 12.3a and 12.3b provide the BNG Assessments for the Eastern Site and Western Sites. The Applicant has developed proposals for the off-site area at Piddington (see Appendix 12.3d for further details). The area is identified on Environment Agency Flood Maps as being within Flood Zone 2 and 3 and is acknowledged as being at risk of flooding. However, this is not considered to be material in terms of the ability of this land to deliver BNG. The habitat proposals would not exacerbate flood risk off-site.

Consultee and Comment	Response
Environment Agency has responded to Albion Land's proposals stating that the proposed off-site compensation area lies within an area at risk of flooding, and therefore the Applicant should provide additional flood risk assessment work. As such, the proposals fail to comply with Policy ESD6 'Sustainable Flood Risk Management' of the Cherwell Local Plan 2011-2031 which aims to protect areas of flood risk.'	
Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust, 18th November 2021	
'We are greatly concerned by the significant loss of wildlife habitat that this development would lead to with the current design.' *…'We do not accept that the benefits of the development outweigh the harm it would cause to the site in relation to the loss of hedgerow and we do not accept that the mitigation proposed will achieve a net gain in biodiversity (see below). In addition, ecological networks provided by the hedgerows will be fragmented as a result of the development and for these reasons we believe the development would be contrary to Policy ESD 10 of the local plan which states that 'ecological corridors should form an essential component of green infrastructure provision in association with new development to ensure habitat connectivity'*	The hedgerows to be removed from the Site comprise defunct species-poor hedgerows which contain large gaps and are not well-connected to the boundary hedgerows or the wider landscape. Therefore, removal of these defunct, species-poor internal hedgerows is not anticipated to fragment ecological networks. The species-rich hedgerows around the boundaries of the Site are to be maintained except for two sections on the northern boundaries to facilitate access points. Replacement hedgerow planting will be completed within the Site, as close to these sections of hedgerow removal as possible, thereby maintaining habitat connectivity around the boundaries of the Site. Additional tree and shrub planting will further contribute to maintaining vegetated boundaries of the Site which will provide habitat connectivity to the wider landscape. It is acknowledged within this chapter that, in the absence of mitigation, a minor adverse effect is anticipated in relation on hedgerows which will be significant at the local level. When considering the mitigation and compensation measures to be applied, including the replacement planting on-Site and hedgerow creation at Piddington, it is concluded that the residual effect on hedgerows will be negligible. It is therefore considered that the Development will comply with national and local policy of relevance including policy ESD 10 of the CDC local plan.
'We are greatly concerned by the significant loss of wildlife habitat used by farmland birds that this development would lead to with the current design.' *…'marsh tit and yellow hammer have been recorded at Stoke Bushes LWS 1.3km from*	Breeding bird surveys have been undertaken at the Site and these are reported in this chapter and in full in Appendix 12.8. The assessment acknowledges a residual minor adverse effect on

Consultee and Comment	Response
the Eastern site and 1.5km from the Western site and skylark, curlew and grey partridge at Upper Heyford Airfield LWS 1.9 km from the Eastern site and 1.8km from the Western site (see tables 12.4 and 12.7).' *…'It therefore seems extremely likely that red list species such as lapwing, skylark, yellowhammer, linnet are to be displaced by the proposed development. In fact, paragraphs 12.6.44 and 12.6.46 acknowledge that the proposed development would 'result in a permanent moderate adverse effect on breeding and overwintering farmland birds present at the …. Site which would be significant at district level'.* *…'We do not accept that the benefits of the development outweigh the loss of red listed farmland bird species and we do not accept that the mitigation proposed will achieve a net gain in biodiversity'.* *…'This application currently does not provide sufficient evidence that it will 'provide habitat that allows bird populations to maintain their numbers in the areas where they naturally live' in relation both to 'wild birds in decline' and to 'wild birds with healthier populations'*	breeding birds (for the Eastern Development and Western Development) significant at a local level. Habitat creation and enhancement measures proposed off-Site at Piddington include the creation of semi-improved neutral grassland and hedgerow habitats which are considered likely to provide alternative, enhanced habitat for birds within the district to forage, nest and shelter. These enhancements are likely to benefit a range of bird species including lapwing, skylark, yellowhammer and linnet. Further enhancements such as scrapes in areas of grassland will be created to provide suitable habitat for lapwing while the grassland will provide suitable habitat for skylark to nest. The land at Piddington will be managed to provide a substantial area of habitat that can be managed optimally for farmland birds and is considered likely to be of a higher quality than the largely arable land that is being lost.
'Once built, if approved, the development can be reasonably assumed to be there for ever, since even when the buildings are replaced it would be likely to be replaced by other forms of development. Therefore, the wildlife habitat will be lost for ever and any compensation must be provided for ever. Otherwise the result is to simply defer a significant loss of biodiversity that should not be occurring either now or in 25 years' time. The most effective method to ensure that any compensation is provided for ever would be for the land identified for off-site habitat creation and enhancement (the Piddington site) to be managed for wildlife in perpetuity with money provided by an endowment fund. Such an endowment fund is already commonly used within the Milton Keynes area when agreements are made involving the Parks Trust taking on land. In perpetuity is considered to be at least 125 years in	In line with statutory requirements, habitat enhancements for biodiversity net gain proposed by the Applicant will be maintained for at least 30 years after the development is completed. The timeframe within the Thames Basin Heaths SPD referenced is specific to SANG provision and the Thames Basin Heaths SPA (located approximately 69km south east of the Site) and is therefore unrelated to the Proposed Development. A HMMP will be prepared and submitted to CDC prior to operation of the Development. The HMMP will describe measures to maximize the biodiversity potential of retained and newly created habitats through appropriate management and will cover a period of 30 years. The HMMP will also cover the management responsibilities and mechanisms. It is envisaged that this will be secured via a S106 agreement.

Consultee and Comment	Response
accordance with legislation which defines the 'in perpetuity' period (Perpetuities and Accumulations Act 2009). There is a precedent for this approach in relation to the Thames Basin Heaths SPA. Para 3.1.5 Thames Basin Heaths Special Protection Area Supplementary Planning Document states: 'The avoidance and mitigation measures should be provided in order that they can function in perpetuity which is considered to be at least 125 years. An 'in perpetuity' period of 125 years has been applied in this SPD in accordance with the legislation which defines the 'in perpetuity' period (Perpetuities and Accumulations Act 2009. Offsite compensation that involves only a 25- or 30-year agreement on private land with no guarantee of the long-term security in perpetuity of the wildlife habitat created would not be appropriate. The loss of wildlife habitat on the site will be permanent so the compensation must be permanent. The offsite compensation must be agreed through a S106 agreement. It is also important that the land should be managed by a reputable conservation organisation with considerable expertise in the management of habitat for wildlife.'	It is therefore concluded that the biodiversity net gain assessment and post-development habitat provisions would comply with relevant legislation and policy.
'Given the proximity of the proposed sites to BBOWT Ardley Quarry and Upper Heyford LWS (and a number of other LWSs see tables 12.4 and 12.7) the application should be looked at in the context of other infrastructure proposals for the area. The cumulative effect of the proposed developments together with the Heyford Park scheme (ref: 18/00825/HYBRID) and the Proposed Oxfordshire Strategic Rail Freight Interchange (Case Reference: TR050008) will mean a huge cumulative effect especially on farmland birds (see above). This cumulative effect on farmland birds is of great concern and needs to be addressed.'	Cumulative effects are assessed in Section 12.8 of this chapter. The possibility of cumulative effects from the Oxfordshire SRFI is acknowledged. However, at the time of writing the Oxfordshire SFRI was not approved and no planning application had been submitted. An EIA Scoping Opinion had been requested in June 2021. This potential cumulative scheme is not considered to be reasonably foreseeable and as such as not been considered in the cumulative assessment. The Heyford Park Environmental Statement acknowledges a permanent residual adverse significant effect at the Site level. As stated within the Biodiversity Environmental Statement Chapter, given that a permanent residual minor adverse significant effect of the local level is also anticipated for the Development on breeding

Consultee and Comment	Response
	birds, it is therefore possible that a cumulative effect may occur, with displaced birds from the local area seeking suitable habitat elsewhere. Following the implementation of mitigation in the form of habitat creation and enhancement both on-Site and off-Site at Piddington, it is concluded that the residual adverse cumulative significant effect on farmland birds will be reduced from district to local level. No residual effects were identified from the other cumulative schemes which were considered to have potential to interact with effects resulting from the Development.

Study Area and Scope

12.3.2 The study area is defined by the Zone of Influence (ZoI) of the Development. As will be described in this chapter, this was determined during the assessment process.

12.3.3 The ZoI is broadly confined to the Site and its immediate surroundings. In accordance with the CIEEM Guidelines, potential effects that could occur at greater distances were assessed with respect to international statutorily protected sites and national statutorily and non-statutorily protected sites up to 10km and 2km, respectively, from the Site. In addition, potential effects to protected and priority fauna species within 2km were considered and air quality effects were considered within 200m of the Site and Affected Road Network (ARN) in relation to designated sites where appropriate as such no assessment of habitats greater than 200m has been provided as part of this assessment.

12.3.4 It was assumed that enabling works and Site clearance will commence in early 2025 and will be operational in 2026.

Establishing Baseline Conditions

12.3.5 To determine the important ecological features within the study area, a combination of desk-based research and surveys was undertaken.

Data Search

12.3.6 Protected and priority species records were obtained from Thames Valley Environmental Records Centre ('TVERC') for the area within a 2km radius of the Site in May 2021 and updated in October 2023. The data search set out to collate existing ecological baseline information available in the public domain and information held by relevant third parties to inform this chapter. Areas around the Site to which searches for information were undertaken varied depending on the ecological resource considered, in accordance with the study area set out in paragraphs 12.3.2-12.3.3.

12.3.7 The following information was received from TVERC:

- Records of legally protected and notable species; and
- Records of non-statutory sites designated for nature conservation value within 2km of the Site.

12.3.8 The online Multi-Agency Geographic Information for the Countryside ('MAGIC') database[19] was consulted (which utilises data provided by Natural England) for records of statutory designated sites and woodland listed on the Ancient Woodland Inventory within 2km of the Site. This search was extended to 10km for Natura 2000 sites (Special Areas of Conservation ('SAC') and Special Protection Areas ('SPA') and Ramsar sites).

Surveys

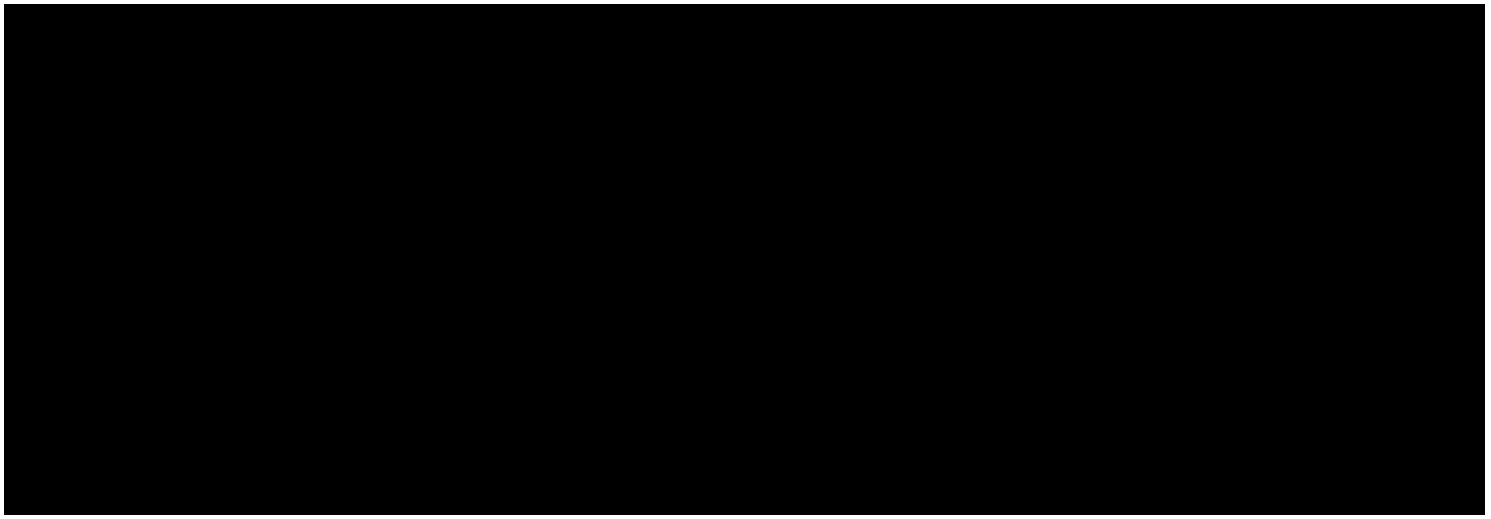
12.3.9 A summary of protected species surveys undertaken is provided below with further details and results presented in Appendix 12.2.

Extended Phase 1/UK Habitat Classification Surveys

12.3.10 An extended Phase 1 habitat survey of the Site was carried out on 17th May 2021 by Tyler Grange Group Ltd and updated in the form of an extended UK Habitat Classification survey on 6th September 2023. The survey covered the entire Site, including boundary features.

12.3.11 Habitats were described and mapped following the standard Phase 1 habitat survey[20] / UK Habitat Classification[21] methodology. These surveys were based on a standard technique for classifying and mapping British habitats. The dominant plant species were recorded, and habitats identified according to their vegetation types. Where appropriate, consideration was given to whether each habitat would qualify as a Habitat of Principal Importance based on habitat descriptions published by the Joint Nature Conservation Committee[22].

Badger (Meles meles)



Barn owl (Tyto alba)

12.3.16 Two barn owl survey visits were completed, on 29th July 2021 and 12th August 2021 by Tyler Grange Group Ltd, in accordance with best practice guidance[26].

12.3.17 The barn owl surveys were led by a holder of a Natural England Class CL29 survey licence for barn owl. The survey focussed on the barn (building B1) on the Western Site as the only structure within the Site considered to have potential to support nesting barn owls. The survey involved an internal and external inspection of the barn to identify and record features which could offer

potential for use by breeding barn owls, to record any evidence of current or historic use as nest or roost sites, and to assess the current status of barn owl at the Site.

12.3.18 Detailed survey methodology and results are provided in Appendix 12.2.

Bats - preliminary roost assessment surveys

12.3.19 A ground level preliminary bat roost assessment ('PBRA') of all buildings and trees present on-Site was completed on 17th May 2021 by Tyler Grange Group Ltd. The PBRA followed the Bat Conservations Trust's (BCT) best practice guidelines current at the time of survey[27i]. The PBRA was updated on 6th September 2023.

12.3.20 The PBRA followed standard methodology which comprised an external, ground-level inspection to assess the potential of buildings and trees to support roosting bats. Detailed survey methodology and results are provided in Appendix 12.2.

Bats – Activity: Transects

12.3.21 Surveys were completed in accordance with BCT guidance[27] current at the time of survey for low suitability habitat, which recommends one dusk activity survey per season (spring: April/May, summer: July/August and autumn: September/October). It was not possible to complete the spring transect visit in 2021 given that ecological surveys began in late May 2021 and therefore two of the recommended three bat activity survey visits (summer and autumn) were completed in 2021 and the remaining spring visit was completed in May 2022.

12.3.22 Surveys were completed on 19th August 2021,13th September 2021 and 24th May 2022 by suitably qualified ecologists from Tyler Grange Group Ltd. The bat activity transect route is shown in Appendix 12.6.

12.3.23 Surveyors used a combination of visual observation and echolocation detection techniques to identify any bat activity on the Site. Detailed survey methodology and results are provided in Appendix 12.2.

Bats – Activity: Static Monitoring

12.3.24 As part of the manned activity survey data, automated static monitoring surveys of the Site were also conducted. Surveys were completed in accordance with BCT guidance[27] current at the time of survey for low suitability habitat as far as possible.

12.3.25 Timings of static monitoring were as per best practice guidance[27], with static detectors set out for five consecutive nights once each season (spring: April/May, summer: July/August and autumn: September/October). It was not possible to complete the spring bat activity survey in 2021. Therefore, two of the three (summer and autumn) recommended[28] static detector deployments were completed in 2021, with the spring visit completed in May 2022.

12.3.26 Two static detectors (one on each transect route) were placed on the northern boundaries of the Site, between 12th-17th August 2021, 1st-6th September 2021 and 18th-24th May 2022. Static bat

[i] It is acknowledged that an updated version of this best practice guidance was released in October 2023. As this was released after the survey date, it was not possible to complete surveys fully in accordance with the updated guidance. However, this is considered unlikely to affect the outcomes of this assessment and this is therefore not considered a limitation on the conclusions of this ES chapter.

detectors used were Anabat Express and Anabat Swift. The location of static detectors placed within the Site is shown in Appendix 12.6.

Bats – Emergence/Re-entry Survey

12.3.27 One dusk emergence survey and one dawn re-entry survey were completed respectively on a barn and a tree within the Western Site by suitably qualified ecologists from Tyler Grange Group Ltd, in accordance with best practice guidelines[27] current at the time of survey. These surveys were completed on 25th August 2021 and 13th September 2021.

12.3.28 Surveyors were positioned to provide adequate visual coverage of all suitable features present on the building. Surveyor locations are shown in Appendix 12.6. Surveyors used a combination of visual observation and echolocation detection to identify any bats emerging from or re-entering the building. Detailed survey methodology and results are provided in Appendix 12.2.

Breeding Bird Survey

12.3.29 Breeding bird surveys were completed by an experienced bird surveyor and member of CIEEM. Two transect routes were established, one within the Eastern Site and one within the Western Site. Each transect route covered a range of habitats considered suitable for breeding birds (including hedgerow, tree, arable, grassland field margins and building habitats) within the Site. The transect routes are shown on the Breeding Bird Survey Results Plan (Appendix 12.8).

12.3.30 Each transect route was walked five times between April and July 2022. Four of the five survey visits as completed at, or soon after, sunrise and one visit was completed immediately prior to sunset. Surveys were completed using an adapted version of the Common Bird Census (CBC) methodology[29] with surveyors walking the transect routes slowly while observing and listening for birds and recording findings on a map.

12.3.31 Detailed survey methodology and results are provided in Appendix 12.2.

Great Crested Newt (GCN) Survey – Habitat Suitability Index Assessment

12.3.32 A Habitat Suitability Index assessment (HSI) of waterbody WB1, which is located within the Eastern Site, as well as WB2, WB3 and WB4, which are all located within 250m of the Site, was completed in conjunction with the extended Phase 1/UK Habitat Classification surveys in 2021 and 2023 where waterbodies were accessible.

12.3.33 The HSI assessment was completed in accordance with best practice guidance[30]. Detailed survey methodology and results are provided in Appendix 12.2.

GCN Survey - Environmental DNA Analysis

12.3.34 All waterbodies considered to have potential to support GCN *Triturus cristatus* following the HSI assessment were subject to environmental DNA (eDNA) analysis. This is an approach approved by Natural England for providing a rapid means of establishing the presence or likely absence of GCN in a waterbody.

12.3.35 Two large waterbodies located approximately 0.1km south of Site were scoped out of further assessment as the waterbodies are separated from the Site by the major roads of the M40 and A43 which are considered to form barriers to the dispersal of GCN to terrestrial habitats within the Site in accordance with relevant guidance[31].

12.3.36 eDNA sampling involved water samples being taken from waterbodies on 16th June 2021 by an experienced GCN surveyor from Tyler Grange Group Ltd. Sterile kits provided by Nature Metrics Ltd were used, following standard methodology to prevent contamination of the samples[32]. Results were reported on by Nature Metrics Ltd on 9th July 2021.

12.3.37 A full copy of the results of this analysis and detailed methodology is provided in Appendix 12.2.

Hazel Dormouse Survey

12.3.38 Hazel dormouse *Muscardinus avellanarius* presence/likely absence surveys were completed between May and early October 2022 inclusive. Surveys involved placement of 100 hazel dormouse nest tubes at the Eastern Site and 100 nest tubes on the Western Site on 4th and 5th May 2022 and subsequently checking the tubes every alternate month until removal of the tubes on 2nd and 3rd October 2022.

12.3.39 Survey methods followed that set out within best practice guidance[33,34] and 100 nest tubes were set out at each respective site.

12.3.40 Detailed survey methodology and results are provided in Appendix 12.2.

Evaluation of Ecological Resources

12.3.41 The evaluation of ecological resources was made with reference to the CIEEM Guidelines[17]. This process included:

- Identifying those ecological features likely to be affected; and
- Evaluating the features to identify those of importance, i.e. those which if their conservation objectives or conservation status were affected, national or local policies (or in some cases legislation) would be triggered.

12.3.42 The level of importance of specific ecological receptors was assigned using a geographic frame of reference using the following terms: International; National; Regional; County; District; and/or Local. Categorisation of ecological receptors within each of these terms is largely dependent on the representation of each receptor within each geographic frame of reference.

Enabling Works and Construction

12.3.43 Likely significant effects on ecological receptors are considered at the construction phase through consideration of elements of the Development required for site clearance and construction work. This also includes consideration of the potential effects of the Enabling Works, as described in Chapter 5: Description of Development.

Completed Development

12.3.44 Likely significant effects on ecological receptors are considered at the completed Development phase through consideration of elements of the Development which are considered likely to occur at the operational stage. Principally, this relates to the operation of the commercial units.

Cumulative Effects

12.3.45 The methodology for the cumulative assessment follows that set out for the main assessment. The ZoI considers the effects of relevant schemes within 10km that have the potential to have an additive or synergistic effect when considered in conjunction with the potential effects of the

Development. Schemes assessed are listed within this chapter, in alignment with those identified in Chapter 3: EIA Methodology.

12.3.46 It is assumed that, as with the Development, all schemes considered will be required to mitigate potential effects upon important ecological receptors and deliver a net gain in biodiversity in-line with the Local Plan.

Determining Effect Significance

Sensitivity of Receptor

12.3.47 The CIEEM Guidelines[17] do not require the sensitivity of the receptor to be assessed. The receptor is described in terms of its ecological importance on a geographical scale which is determined through professional judgement and is based on factors such as quality and extent of a habitat, or the rarity of a habitat or species. For the purposes of this ES, to define the value or sensitivity of an ecological feature, the geographical scale referenced in the CIEEM Guidelines[17] was applied as set out in Table 12.2.

Table 12.2: Receptor Sensitivity Descriptors

Value (Sensitivity)	Descriptor (CIEEM Equivalent)
Very High	International
High	National
Medium	Regional, County
Low	District, Local
Negligible	Negligible

Magnitude of Impact

12.3.48 Impacts were described with reference to the following characteristics where relevant:

- Positive or negative;
- Extent;
- Magnitude;
- Duration;
- Timing;
- Frequency; and
- Reversibility.

12.3.49 Magnitude refers to extent, amount, intensity and volume. It is quantified where available data allows and is expressed in absolute or relative terms, e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population.

Assessing Significance

12.3.50 The significance of ecological effects uses terminology derived from CIEEM Guidelines[17]. The approach is summarised below:

- **Designated Sites and Ecosystems:** Significant effects encompass impacts on structure and function of defined sites and ecosystems. For designated sites the focus is whether the Development and associated activities are likely to undermine the site's conservation

objectives or negatively affect the conservation status of the species or habitats for which the site is designated. For ecosystems, the focus is whether the Development is likely to result in a change in its structure or function; and

- **Habitats and Species:** Consideration of conservation status is important for evaluating the significance of effects on individual habitats and species. Conservation status for habitats is determined by the sum of the influences acting on the habitat that may affect its extent, structure and function as well as its typical species composition within a given geographical area. For species, it is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

12.3.51 Potential and residual effects (adverse or beneficial) are defined in Table 12.3 and can be either temporary or permanent.

Table 12.3: Definitions of Significance Criteria for Ecology

Significance Criteria	Description of Criteria
Very Substantial (Major) Beneficial	A beneficial effect on the conservation status of a defined site or ecosystem(s) and/or the habitats or species that is significant at a regional level or above.
Substantial (Major) Beneficial	A beneficial effect on the conservation status of a defined site or ecosystem(s) and/or the habitats or species that is significant at a county level.
Moderate Beneficial	A beneficial effect on the conservation status of a defined site or ecosystem(s) and/or the habitats or species that is significant at a district level.
Minor Beneficial	A beneficial effect on the conservation status of a defined site or ecosystem(s) and/or the habitats or species that is significant at a site or local level.
Negligible	No significant effect on an important ecological feature.
Minor Adverse	An adverse effect on the conservation status of a defined site or ecosystem(s) and/or the habitats or species that is significant at a site or local level.
Moderate Adverse	An adverse effect on the conservation status of a defined site or ecosystem(s) and/or the habitats or species that is significant at a district level.
Substantial (Major) Adverse	An adverse effect on the conservation status of a defined site or ecosystem(s) and/or the habitats or species that is significant at a county level.
Very Substantial (Major) Adverse	An adverse effect on the conservation status of a defined site or ecosystem(s) and/or the habitats or species that is significant at a regional level or above.

Future baseline

12.3.52 The baseline habitats on the Site were in a managed condition at the time of the extended Phase 1 habitat survey. Given the arable nature of the Site, it is anticipated that, in the absence of the Development, similar management would continue in a future baseline scenario in 2026.

12.3.53 It is acknowledged that climate change may cause changes in species composition within the UK, including the Site, over time. However, given that these changes are not known and are unlikely to be of relevance in 2026 considering the way the Site is managed for agricultural purposes, it is assumed that conditions will remain the same or similar to current conditions. Therefore, it is anticipated that the future baseline of the Site would remain the same or similar to the baseline recorded during the extended Phase 1 habitat survey and would contain similar habitats and species as described in the 'Baseline Conditions' of this chapter.

12.3.54 Later in this chapter the potential effects of air pollution from traffic from the development are considered. As noted later, with respect to the future baseline, the existing background levels of pollutants from vehicles with combustion engines are expected to reduce over time (with the possible exception of ammonia) owing to vehicle fleet decarbonisation (new diesel and petrol cars and vans would no longer be sold from 2035). The relevance of this is described later.

Assumptions and Limitations

12.3.55 It is acknowledged that much of the survey data presented within this ES chapter was obtained in 2021-2022. However, the Site was subject to an updated desk study, extended UK Habitat Classification survey, PBRA and HSI in September 2023. These updated surveys found the Site to be in a managed state with little to no changes in habitat types or their potential to support protected or priority species since when compared to the initial survey data from 2021-2022. CIEEM guidance on the lifespan of ecological survey data[35] suggests that survey data may be valid for up to three years where site conditions are unchanged, to be verified by an updated site visit and desk study. Considering the results of the updated site visit and desk study, in addition to the habitat types present, it is considered unlikely that significant changes in species presence or distribution have occurred within the site since surveys were completed in 2021-2022. Therefore, the age of survey data is not considered to be a significant limitation to the conclusions of the ecology chapter and data are considered valid for the purposes of this assessment in accordance with CIEEM guidance[35].

12.3.56 It is assumed one moderate suitability tree (T19) on the northern boundary of the Western Site may be removed to facilitate a vehicular access point and, due to the proximity of the works, two moderate suitability trees (T4 and T5) may be subject to disturbance. A reasonable worst-case assumption that these trees each contain a low conservation status bat roost has been adopted based on survey data to date (which found no roosts within tree T1 and building B1), data search records and professional judgement.

12.4 Baseline Conditions

Eastern Site

Designated sites

Statutory sites

12.4.1 The data search confirmed that there are no SPAs, SACs or Ramsar sites within 10km of the Site.

12.4.2 One Site of Special Scientific Interest (SSSI) designated for biological interest, Ardley Cutting and Quarry SSSI, was identified within 2km of the Site, located approximately 1.3km south west of the Eastern Site Boundary. This SSSI is designated partially for geological reasons and partially for calcareous limestone grassland and ancient woodland habitats (outside of the 200m assessment zone) which host a large population of GCN and a range of invertebrate species including small blue butterfly *Cupido minimus*, dark green fritillary *Argynnis aglaja* butterfly and four-spotted moth *Tyta luctuosa*. This SSSI is considered to be of national ecological importance. The location of the SSSI is shown in Appendix 12.5.

Non-statutory sites

12.4.3 Five Local Wildlife Sites (LWSs) and one Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT) Reserve were returned from the data search within 2km of the Site which are described in Table 12.4. LWSs are designated if the site meets the criteria for the selection of LWSs in Berkshire, Buckinghamshire and Oxfordshire[36]. These non-statutory sites are considered to be of county ecological importance with the exception of the BBOWT reserve which does not form an LWS and is therefore considered to be of district ecological importance.

Table 12.4: Summary of Non-statutory Designated Sites, Eastern Site

Site Name	Location from Site	Description
Ardley Quarry BBOWT Reserve	1.3km south west	Designated for scrub, woodland (including ancient semi-natural woodland) and rough grassland habitats containing a range of plant species such as cowslips *Primula veris*, common spotted-orchid *Dactylorhiza fuchsii* and bee orchid *Ophrys apifera*; butterflies including grizzled skipper *Pyrgus malvae* and green hairstreak *Callophrys rubi*, birds including chiffchaff *Phylloscopus collybita* and bullfinch *Pyrrhula pyrrhula* and reptiles.
Stoke Bushes LWS	1.16km north east	Designated for woodland habitat dominated by oak *Quercus* sp. and ash *Fraxinus excelsior* trees with a ground flora including dog's mercury *Mercurialis perennis*, bluebell *Hyacinthoides non-scripta*, wood anemone *Anemone nemorosa* and wood sedge *Carex depauperata*. Bird species of principal importance including marsh tit *Poecile palustris* and yellowhammer *Emberiza citrinella* have also been recorded.
Stoke Wood LWS	0.32km south	Designated for ancient woodland with records of 31 plant species including bluebell, primrose *Primula vulgaris* and wood spurge *Euphorbia amygdaloides*. Butterflies including silver-washed fritillaries *Argynnis paphia* and white admiral *Limenitis camilla* have been recorded.

Site Name	Location from Site	Description
Stoke Little Wood LWS	1.4km south east	Designated for ancient woodland habitat, dominated by oak, ash and field maple *Acer campestre* with a shrub layer including Midland hawthorn *Crataegus laevigata* and hazel *Corylus avellana* and a ground flora including dog's mercury, bluebell and common dog violet *Viola riviniana*. Red kite *Milvus milvus* and badger have also been recorded.
Ardley Fields Quarry LWS	1.9km south	An area of restored quarry designated for grassland, pond and wet ditch habitats. The grassland is predominately species-poor with kidney vetch *Anthyllis vulneraria*, field scabious *Knautia arvensis* and burnet saxifrage *Pimpinella saxifrage* recorded in small areas. A number of bird species have been recorded including teal *Anas crecca*, gadwall *Mareca strepera* and little ringed plover *Charadrius dubius*.
Upper Heyford Airfield LWS	1.9km south west	Designated for grassland habitat including some areas of species-rich calcareous grassland. Plant species include cowslip, greater knapweed *Centaurea scabiosa* and lady's *bedstraw Galium verum*. A large population of GCN have been recorded within water storage tanks within he LWS. Birds recorded include skylark *Alauda arvensis*, curlew *Numenius arquata* and grey partridge *Perdix perdix*. Fourteen species of butterfly have been recorded at the site including Essex skipper *Thymelicus lineola*, large skipper *Ochlodes sylvanus* and small heath *Coenonympha pamphilus*.
Twelve Acre Copse LWS	2.2km south east	The LWS is designated on the basis of its ancient woodland habitat and that it supports protected and notable species such as Bluebell *Hyacinthoides non-scripta* as well as species typical of long established woodland.

Habitats

12.4.4 The Phase 1/UK Habitat Classification surveys identified several habitat types within or directly adjacent to the Site. The locations and extent of these habitats are illustrated in Appendix 12.4.

Arable and Horticulture - Cereal crops

12.4.5 The majority of the Eastern Site is formed of arable fields containing cereal crops. Arable fields are of limited inherent ecological value and are considered to be of negligible ecological importance. The potential for this habitat type to support protected species (e.g. birds) is discussed separately below.

Grassland - Modified Grassland

12.4.6 Modified grassland formed the margins of the arable fields, dominated by perennial ryegrass *Lolium perenne* with Yorkshire fog *Holcus lanatus* and white clover *trifolium repens*. Modified grassland is of limited inherent ecological value and are considered to be of negligible ecological importance.

Hedgerows

12.4.7 Five hedgerows are present within the Eastern Site, forming the boundaries around the Eastern Site and partly demarcating the boundaries between arable fields:

- Hedgerows H10, H11, H12 and H13 are species-poor defunct hedgerows with multiple gaps. These hedgerows are dominated by common hawthorn *Crataegus monogyna* and blackthorn *Prunus spinosa* located on the eastern and southern boundaries of the Eastern Site and demarcating field boundaries in the centre of the Eastern Site; and
- Hedgerow 9 is an intact species-rich hedgerow with trees forming the western and northern boundaries of the Eastern Site. Tree species comprised pedunculate oak *Quercus robur*, ash, hazel and field maple. Shrub species included hawthorn, blackthorn, elder *Sambucus nigra*, holly *Ilex aquifolium* and dog rose *Rosa canina*.

12.4.8 Hedgerows are listed in Section 41 of the NERC Act 2006 as a priority habitat and based on the criteria listed in the UK BAP Priority Habitat Descriptions[22], the species-rich hedgerow H9 is likely to qualify as such. Although widespread in the wider landscape, the hedgerows present at the Site provide a network for mobile species and are irreplaceable in the short-term. The hedgerows are considered to be of local ecological importance.

Other standing water - Ponds

12.4.9 One waterbody is identified within the Eastern Site, waterbody WB1. WB1 is a small waterbody located within an arable field. The waterbody had limited aquatic and bankside vegetation at the time of the extended Phase 1 habitat survey. Ponds do offer some ecological value although this pond is unlikely to qualify as a priority habitat under the JNCC criteria for ponds[22] and, as such, this habitat is considered to be of local ecological importance.

Dense Scrub - Bramble Scrub

12.4.10 One small area of dense bramble *Rubus fruticosus* agg. scrub is present surrounding waterbody WB1. This habitat is primarily comprised of bramble with common hawthorn and hazel. Given the small area and the prevalence of this habitat type in the wider landscape, this habitat is considered to be of negligible ecological importance.

Trees

12.4.11 Semi-mature ash trees are located along the north east boundary of the Eastern Site, and form part of hedgerow H9. These trees are considered to contribute to providing habitat connectivity between the Site and the wider landscape although, given the prevalence of mature trees in the wider landscape and that the species present are common and widespread, these trees are considered to be of local ecological importance.

Ancient Woodland

12.4.12 There is no ancient woodland located within the Eastern Site. The closest ancient woodland to the Eastern Site is located approximately 330m south of the Eastern Site at Stoke Wood LWS. Ancient woodland is an irreplaceable habitat although it occurs frequently throughout the county. It is therefore considered to be of up to county ecological importance. Two areas of ancient woodland are present within 200m of the B4100 which is anticipated to be utilised by traffic associated with the Development, at Stoke Wood LWS and Stoke Little Wood LWS (c.1.4km southeast of the Eastern Site).

Species

[redacted]

Barn Owl

12.4.18 The desk study returned four records of barn owl, the closest of which was located approximately 0.3km south of the site in 2017.

12.4.19 The barn owl survey identified no signs of barn owl within building B1 on the Western Site and no other trees or buildings were identified that were considered suitable for nesting barn owl within either the Eastern or Western Sites. Building B1 was found to offer limited nesting opportunities and it is therefore considered that nesting barn owl are likely absent from building B1.

12.4.20 Habitats within the Site are of limited suitability for barn owl to forage, being comprised primarily of intensive arable farmland with only narrow modified grassland margins. Therefore, nesting barn owl are assumed likely absent from the Eastern Site and are not discussed further within this assessment.

Bats

12.4.21 The data search from TVERC returned 13 records of bats within 2km of the Site with the closest records to the Eastern Site located approximately 1.4km east of the site. These records comprised the following species: common pipistrelle *Pipistrellus pipistrellus* and brown long-eared *Plecotus auritus*, Leisler's bat *Nyctalus leisleri*, Natterer's *Myotis nattereri*, noctule *Nyctalus noctula,* soprano pipistrelle *Pipistrellus pygmaeus* and whiskered *Myotis mystacinus* or Brandt's bat *Myotis brandtii* (identification unconfirmed).

12.4.22 Three ash trees with low suitability for roosting bats have been identified on the northern boundary of the Eastern Site. In accordance with best practice guidelines[27] current at the time of survey, no further survey work is required for low suitability trees. If removal of these trees were to be required, they would be soft-felled under the supervision of an ecological clerk of works (ECoW).

12.4.23 The hedgerow habitats within and on the boundaries of the Site offer limited suitable commuting or foraging opportunities for bats while arable habitat is sub-optimal for foraging or commuting bats. Therefore, the habitat is considered to be of low suitability for bat activity.

12.4.24 The walked bat activity transect surveys identified at least six bat species utilising the Eastern Site: western barbastelle *Barbastella barbastellus*, *Myotis* species, noctule, an unidentified *Nyctalus* species, common pipistrelle and soprano pipistrelle. The majority of this bat activity was concentrated on the boundaries of the Eastern Site, with the majority of activity recorded on the western and southern boundaries, as shown in Appendix 12.4. Low levels of activity were detected on the northern boundary (hedgerow H9) and internal hedgerows (hedgerows H12 and H13) within the Eastern Site. No activity was observed on the eastern boundary of the Eastern Site (hedgerow H10). The majority of activity recorded was from common and soprano pipistrelle. Full results are presented in Appendix 12.2.

12.4.25 As shown in Table 12.5 below, the static monitoring surveys recorded seven bat species with the majority of bats comprising soprano pipistrelle and common pipistrelle. Western barbastelle was the rarest species recorded but in small numbers with the highest number of passes per night[ii] being 9.4 passes during the autumn survey in September 2021. It is anticipated that no western barbastelle roosts are located within or adjacent to the Eastern Site as no passes were identified within an hour of sunrise or sunset and no passes were recorded during the spring or summer surveys. The number of passes per night for other more common species are also considered to be low relative to their population size (as shown in Table 12.6).

[ii] Averaged over the five nights of recording within each month

Table 12.5: Static monitoring results summary, Eastern Site

Passes	Species											Total passes
	Bb	*BLE*	*Myo*	*Myo/ Plec*	*Nn*	*Ppi*	*Ppy*	*Ppn*	*PIP*	*Nyc*	*Unknown*	
August 2021:	0	0	6	0	32	3	0	0	0	0	1	42
September 2021:	47	4	51	2	10	290	321	1	0	0	0	726
May 2022:	0	0	3	0	0	422	0	0	0	0	0	425
Total passes per species:	47	4	60	2	42	715	321	1	0	0	1	1,193
Percentage of total passes:	3.94	0.34	5.03	0.17	3.52	59.93	26.91	0.08	0.00	0.00	0.13	
August passes per night:	0	0	1.2	0	6.4	0.6	0	0	0	0	0.2	
September passes per night:	9.4	0.8	10.2	0.4	2	58	64.2	0.2	0	0	0	
May passes per night:	0	0	0.6	0	0	84.4	0	0	0	0	0	

Key: Bb = western barbastelle, BLE = brown long-eared, Myo = Myotis species, Myo/Plec = Myotis or Plecotus species, not identifiable to species level, Unknown = not identifiable, Nn = noctule, Ppi = common pipistrelle, Ppy = soprano pipistrelle, Ppn = Nathusius' pipistrelle *Pipistrellus nathusii*, PIP = Pipistrellus species not identifiable to species level, Nyc = Nyctalus species not identifiable to species level, Unknown = not identifiable.

12.4.26 The estimated population size in England and the occurrence in the region for each species identified during the activity surveys is provided in Table 12.6 below.

Table 12.6: Population size of species recorded

Species	Estimated England population size[37]	Description of Occurrence nationally and locally
Western barbastelle	Unknown	Relatively infrequent throughout the country and regionally
Brown long-eared bat	607,000	Common throughout the country and regionally
Noctule	565,000	Common throughout the country and regionally
Common pipistrelle	1,870,000	Common throughout the country and regionally
Soprano pipistrelle	2,980,000	Common throughout the country and regionally
Nathusius' pipistrelle	Unknown	Relatively infrequent throughout the country and regionally

12.4.27 An assessment based on the UK Bat Mitigation Guidelines determined that the importance score for bat assemblages at the Eastern Site is 19[iii], which falls below the threshold for county ecological significance.

12.4.28 Given that no barbastelle roosts likely to be present nearby due to the timing records and considering the habitats present and given that the species recorded during the activity surveys were predominately widespread species with a total importance score not meeting the threshold for county importance in accordance with the bat mitigation guidelines, the bat assemblage utilising the Eastern Site is considered to be up to district ecological importance.

Birds – Breeding and Wintering

12.4.29 The data search from TVERC returned records of several bird species within 2km of the Site. The closest records to the Eastern Site were of five species, located approximately on the western boundary of the Eastern Site although the grid references provided by TVERC are accurate to 1km and therefore presence within the Eastern Site cannot be confirmed. Species recorded at this location were: barn owl *Tyto alba*, kestrel *Falco tinnunculus*, lapwing *Vanellus vanellus*, lesser spotted woodpecker *Dendrocopos minor* and red kite.

12.4.30 A total of 19 species of bird were recorded within the Site during the breeding bird surveys. The majority of species were relatively common and widespread, with four species on the Birds of Conservation Concern (BoCC) Amber list[38] and five species on the BoCC Red list[38] recorded. Peak counts of farmland birds comprised: 2 grey partridge *Perdix perdix,* 10 linnet *Linaria cannabina*, 17 skylark *Alauda arvensis* records, only 2 confirmed, 1 probable, and 7 possible

[iii]Assuming that Leisler's bat were present within the unidentified *Nyctalus* calls and two *Myotis* species were present on a precautionary basis although, given the habitats present and the low activity levels generally, this is considered unlikely.

territories were identified, along with 4 yellowhammer *Emberiza citrinella* records. are considered to be present in accordance with BTO guidance[39], giving a maximum of 10 territories within the Eastern Site.

12.4.31 The Eastern Site is surrounded by large areas of arable and grassland habitats in the wider landscape. Given this, and the intensively-managed nature of habitats within the Eastern Site with an absence of skylark plots or other low vegetation during the breeding season, the Site is not optimal nesting habitat for skylark, which are likely to prefer arable and grassland habitats in the wider landscape. Considering this context in combination with the breeding bird survey results, the Eastern Site is considered likely to support a small breeding assemblage of farmland birds.

12.4.32 The Site is distant from any SPAs or Ramsar sites designated for populations of wintering bird species. Furthermore, the habitats within the site are unlikely to support an important assemblage of wintering birds which are not also present as breeding populations. Therefore, breeding bird surveys were considered sufficient and targeted wintering bird surveys are not considered necessary. The remainder of this ES Chapter therefore focusses on breeding birds although acknowledges that the majority of breeding bird species are likely to be present at the Site year-round.

12.4.33 Given the survey results, in addition to the types of habitats present and the intensive nature of agricultural practice at the Site (with defunct hedgerows, narrow field margins and no plots with short vegetation for ground-nesting birds), it is considered unlikely that the Eastern Site supports an ecologically important assemblage of farmland bird species.

12.4.34 Overall, it is considered that the Eastern Site supports a small assemblage of farmland bird species. Farmland birds are known to be in decline nationally. However, given the relatively low numbers of farmland birds recorded during the breeding bird surveys in addition to the sub-optimal habitats present on the Eastern Site and the prevalence of agricultural habitats within the wider landscape, the Eastern Site is assumed to contain a bird assemblage of district ecological importance.

Great crested newt

12.4.35 The data search from TVERC returned 39 records of GCN within 2km of the Site, with the closest record to the Eastern Site located approximately 1.2km southwest. The typical dispersal distance of GCN from breeding ponds is up to 250m, which may extend to 500m[40] in the absence of barriers to dispersal (such as major roads or fast-flowing watercourses) and therefore this record is well beyond typical dispersal distances and GCN present at this location are not considered to be able to access habitats within the Site.

12.4.36 Suitable terrestrial habitat for GCN (such as scrub, woodland and tussocky grassland) are limited in extent within the Eastern Site. Arable habitat is considered to be sub-optimal for GCN and there is limited connectivity between arable habitat within the Eastern Site and areas of optimal habitat in the wider landscape.

12.4.37 The waterbody within the Eastern Site, waterbody WB1, was found to be of 'poor' suitability for GCN on HSI assessment and the waterbody is relatively isolated from suitable terrestrial habitat, being located in the centre of arable fields. Therefore, GCN are assumed likely absent from waterbody WB1.

12.4.38 Four other waterbodies are identified within 250m of the Eastern Site, hereafter referred to as waterbodies WB2, WB3, WB4 and WB5. These waterbodies were subject to HSI assessment, and waterbodies WB2, WB3 and WB5 were found to be of 'poor' suitability for GCN on HSI assessment. All waterbodies were found to be relatively isolated from areas of optimal GCN terrestrial habitat, being primarily sited in residential or arable contexts. Waterbody WB4 was found to be of 'average' suitability on HSI assessment and was therefore subject to presence/likely absence survey, see below. All waterbody locations are shown in Appendix 12.4.

12.4.39 An eDNA survey to establish the presence/likely absence of GCN was completed on waterbody WB4 and a negative result for GCN presence was returned following laboratory analysis. Therefore, GCN are assumed likely absent from this waterbody. Based on results of the HSI assessment and eDNA survey, GCN are considered likely absent from the Site and are not considered further within this assessment.

Hazel dormouse

12.4.40 The data search from TVERC returned no records of hazel dormouse within 2km of the Site.

12.4.41 No evidence of hazel dormouse was identified during the hazel dormouse surveys within the Eastern Site. Evidence of wood mouse *Apodemus sylvaticus*, a common and widespread mouse species, was incidentally found in two locations on the boundaries of the Site.

12.4.42 Hedgerows within and on the boundaries of the Eastern Site are not connected to the Western Site, being separated by the A43 road (a busy four-lane A-road) which is considered likely to act as a barrier to dispersal of any hazel dormouse utilising the Western Site (see 12.4.86-12.4.88). Furthermore, connectivity between the Eastern Site and optimal habitat for dormouse (generally considered to be woodlands of ten hectares or greater in size[41]) is limited. Therefore, hazel dormouse are considered to be likely absent from the Eastern Site.

Reptiles

12.4.43 The data search from TVERC returned two records common lizard *Zootoca vivipara,* located approximately 1.5km south of the Site.

12.4.44 Habitats present within the Eastern Site that are suitable for reptiles are limited to the central hedgerows and grassland margins and the boundary hedgerows which may provide some limited sheltering, foraging or basking opportunities. The arable habitat forming the majority of the Eastern Site is considered to be sub-optimal for reptiles and therefore the Eastern Site is unlikely to support large populations of reptiles. It is therefore assumed that any small populations of reptiles that may be present would be formed of common and widespread species and would be of up to local ecological importance.

Other species

12.4.45 The habitats within the Eastern Site are not considered suitable to support any protected or notable species other than those discussed above.

Western Site

Designated sites

Statutory sites

12.4.46 The data search confirmed that there are no SPAs, SACs or Ramsar sites within 10km of the Site.

12.4.47 One Sites of Special Scientific Interest (SSSI) designated for biological interest, Ardley Cutting and Quarry SSSI, was identified within 2km of the Site, located approximately 1.3km south west of the Western Site. This SSSI is designated partially for geological reasons and partially for its calcareous limestone grassland and ancient woodland habitats (outside of the 200m assessment zone) which host a large population of GCN and a range of invertebrate species including small blue butterfly *Cupido minimus* and dark green fritillary *Argynnis aglaja* butterfly and four-spotted moth *Tyta luctuosa*. This SSSI is considered to be of national importance. The location of the SSSI is shown in Appendix 12.5.

Non-statutory sites

12.4.48 Five Local Wildlife Sites (LWSs) and one BBOWT Reserve were returned from the data search within 2km of the Site which are described in Table 12.7. LWSs are designated if the site meets the criteria for the selection of LWSs in Berkshire, Buckinghamshire, and Oxfordshire. These non-statutory sites are considered to be of county ecological importance with the exception of the BBOWT reserve which does not form an LWS and is therefore considered to be of district ecological importance.

Table 12.7: Summary of Non-statutory Designated Sites within 2km of site, Western Site

Site Name	Location from Site	Description
Ardley Quarry Berks, Bucks and Oxon Wildlife Trust (BBOWT) Nature Reserve	1.5km south	Designated for scrub, woodland and rough grassland habitats containing a range of plant species such as cowslips, common spotted-orchid and bee orchid; butterflies including grizzled skipper and green hairstreak, birds including chiffchaff and bullfinch and reptiles.
Stoke Bushes LWS	1.5km north east	Designated for woodland habitat dominated by oak and ash trees with a ground flora including dog's mercury, bluebell, wood anemone and wood sedge. Bird species of principal importance including marsh tit and yellowhammer have also been recorded.
Stoke Wood LWS	0.63km south	Designated for ancient woodland with records of 31 plant species including bluebell, primrose, and wood spurge. Butterflies including silver-washed fritillary and white admiral have been recorded.

Site Name	Location from Site	Description
Stoke Little Wood LWS	1.8km south east	Designated for ancient woodland habitat, dominated by oak, ash and field maple with a shrub layer including Midland hawthorn and hazel and a ground flora including dog's mercury, bluebell and common dog violet. Red kite and badger have also been recorded.
Ardley Fields Quarry LWS	1.8km south	An area of restored quarry designated for grassland, pond and wet ditch habitats. The grassland is predominately species-poor with kidney vetch, field scabious and burnet saxifrage recorded in small areas. A number of bird species have been recorded including teal, gadwall and little ringed plover.
Upper Heyford Airfield LWS	1.8km south west	Designated for grassland habitat including some areas of species-rich calcareous grassland. Plant species include cowslip, greater knapweed and lady's bedstraw. A large population of GCN have been recorded within water storage tanks within he LWS. Birds recorded include skylark, curlew and grey partridge. Fourteen species of butterfly have been recorded at the site including Essex skipper, large skipper and small heath.
Twelve Acre Copse LWS	2.2km south east	The LWS is designated on the basis of its ancient woodland habitat and that it supports protected and notable species such as Bluebell *Hyacinthoides non-scripta* as well as species typical of long established woodland.

Habitats

12.4.49 The extended Phase 1 habitat and UK Habitat Classification surveys identified several habitat types within or directly adjacent to the Western Site. The locations of these habitats are illustrated on Appendix 12.4 and habitats are described below.

Arable and Horticulture - Cereal crops

12.4.50 The majority of the Western Site is formed of intensively managed arable fields. Arable fields are of limited inherent ecological value and are considered to be of negligible ecological importance. The potential for this habitat type to support protected species (e.g. birds) is discussed separately below.

Buildings

12.4.51 One barn building is present within the Western Site, hereafter referred to as building B1. Buildings are of limited inherent ecological value and are considered to be of negligible ecological importance. The potential for buildings to support protected species (e.g. bats) is discussed separately below.

Grassland - Modified Grassland

12.4.52 Modified grassland forms the margins of the arable fields, dominated by perennial ryegrass. Modified grassland is of limited inherent ecological value and are considered to be of negligible ecological importance.

Hedgerows

12.4.53 Eight hedgerows are present within the Western Site, forming the boundaries around the Western Site and partly demarcating the boundaries between arable fields. A description on their structure and species composition is provided below:

- Hedgerows H3, H4, H5 and H6 are species-poor defunct hedgerows, demarcating field boundaries in the centre of the Western Site and dominated by common hawthorn;
- Hedgerows H1, H2, and H8 are intact species-rich hedgerows with trees forming the western, southern and northern boundaries of the Western Site and primarily comprised of field maple, blackthorn, hawthorn, hazel and sycamore *Acer pseudoplatanus* with honeysuckle *Lonicera periclymenum*; and
- Hedgerow H7 is an intact species-poor hedgerow with trees forming the majority of the north eastern boundary of the Western Site comprised primarily of hawthorn, blackthorn, ash and holly.

12.4.54 Hedgerows are listed in Section 41 of the NERC Act 2006 as a priority habitat and based on the criteria listed in the UK BAP Priority Habitat Descriptions, the species-rich hedgerows are likely to qualify as such. Although widespread in the wider landscape, the hedgerows present at the Western Site provide a network for mobile species and are irreplaceable in the short-term. The hedgerows present are considered to be of local ecological importance.

12.4.55 A small length of coniferous hedge is also present on part of the north east boundary of the Western Site which is considered to be of negligible ecological importance.

Dense Scrub - Mixed Scrub

12.4.56 One small area of Mixed scrub is present in the west of the Western Site. This habitat was primarily comprised of bramble but with occasional specimens of hawthorn, blackthorn and ash. Given the small area and the prevalence of this habitat type in the wider landscape, this habitat is considered to be of negligible ecological importance.

Ruderal or Ephemeral - Tall ruderal

12.4.57 One small area of tall ruderal habitat was recorded (indicated by TN1 in Appendix 12.4) in the south-west corner and the centre of the Western Site. This habitat is dominated by nettle *Urtica dioica*. Given the small area and the prevalence of this habitat type in the wider landscape, this habitat is considered to be of negligible ecological importance.

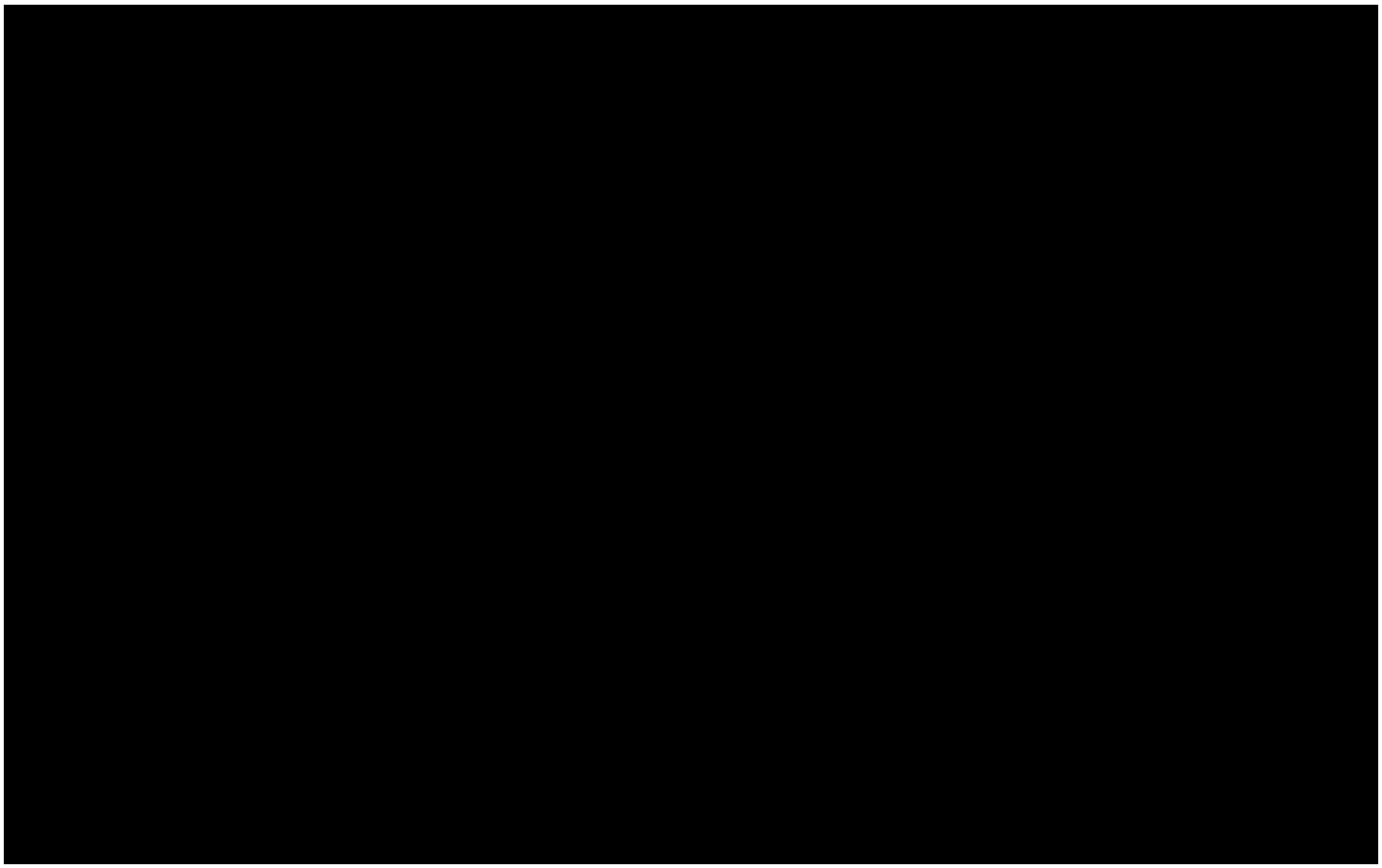
Trees

12.4.58 Semi-mature and mature trees are present within the Western Site, primarily located along the northern and eastern boundaries, within the hedgerows. These trees are considered to contribute to providing habitat connectivity between the Site and the wider landscape although, given the prevalence of mature trees in the wider landscape and that the species present are common and widespread, these trees are considered to be of local ecological importance.

Ancient Woodland

12.4.59 There is no ancient woodland located within the Western Site. The closest ancient woodland to the Western Site is located approximately 590m south of the Western Site at ‘Stoke Wood’ LWS. Ancient woodland is an irreplaceable habitat although it occurs frequently throughout the county. It is therefore considered to be of up to county ecological importance.

Species



Barn owl

12.4.65 The desk study returned four records of barn owl, the closest of which was located approximately 0.3km south of the site in 2017.

12.4.66 Two barn owl surveys were completed on building B1 in the Western Site and identified no signs of nesting barn owl. Habitats within the Site are of limited suitability for barn owl to forage, being comprised primarily of intensive arable farmland with only narrow modified grassland margins. Nesting barn owl are therefore considered likely absent from the Western Site and are not discussed further within this assessment.

Bats

12.4.67 The data search from TVERC returned 13 records for bats within 2km of the Site with the closest records to the Western Site located approximately 1.4km east. These records were comprised of common pipistrelle, brown long-eared, Leisler's bat, Natterer's, noctule, soprano pipistrelle and whiskered or Brandt's bat (identification unconfirmed).

12.4.68 Several trees with low suitability and five trees with moderate suitability for roosting bats were recorded on the northern and eastern boundaries of the Western Site. In accordance with best practice guidelines[27] current at the time of survey, no further survey works are required for low suitability trees. One moderate suitability tree (T19) may be removed on the northern boundary of the Western Site to facilitate a vehicular access point and, due to the proximity of the works, two moderate suitability trees T4 and T5 may be subject to disturbance. Therefore, a reasonable worst-case evaluation is set out below in relation to these trees, based on survey results undertaken to date and professional judgement.

12.4.69 No bats were observed re-entering Tree T1 or Building B1 during the emergence / re-entry surveys on 25th August 2021 or 13th September 2021. Roosting bats are therefore considered likely absent from Tree T1 and Building B1.

12.4.70 The hedgerow habitats within and on the boundaries of the Site offer limited suitable commuting or foraging opportunities for bats while arable habitat is sub-optimal for foraging or commuting bats. Therefore, the habitat is considered to be of low suitability for bat activity.

12.4.71 The walked transect surveys identified at least four bat species utilising the Western Site: *Myotis* species, noctule, common pipistrelle, soprano pipistrelle. Bat activity was concentrated on the boundaries of the Western Site, with the majority of activity recorded on the eastern (hedgerow H7) and southern (hedgerow H2) boundaries, as shown in Appendix 12.4. Low activity levels were identified on the northern boundary of the Western Site (hedgerow H8). No activity was observed on the north-western boundary hedgerow (hedgerow H1) or the internal hedgerows of the Western Site (hedgerows H3, H4, H5 and H6). The majority of activity recorded was from common and soprano pipistrelle. Full results are presented in Appendix 12.2.

12.4.72 As shown in Table 12.8 below, the static monitoring surveys recorded seven bat species with the majority of bats comprising soprano pipistrelle and common pipistrelle. Western barbastelle was the rarest species recorded but in small numbers with the highest number of passes per night[iv] being five passes during the September survey. It is anticipated that no western barbastelle roosts are located within or adjacent to the Site as no passes were identified within an hour of sunrise or sunset and no passes were recorded during the spring survey, with only three passes during the summer survey. The number of passes per night for other more common species are also considered to be low relative to their population size (as shown in Table 12.9).

[iv] Averaged over the five nights of recording within each month

Table 12.8: Static Detector results, Western Site

	Species										
Species:	*Bb*	*BLE*	*Myo*	*Nn*	*Ppi*	*Ppy*	*Ppn*	*PIP*	*Nyc*	*Unknown*	Total passes
August 2021:	3	2	7	12	19	2	0	0	0	0	45
September 2021:	25	3	180	28	1434	39	1	34	4	12	1,760
May 2022:	0	0	3	0	422	0	0	0	0	0	425
Total passes per species:	28	5	190	40	1875	41	1	34	4	12	2,230
Percentage of total passes:	1.26	0.22	8.52	1.79	84.08	1.84	0.04	1.52	0.18	0.54	
August passes per night:	0.6	0.4	1.4	2.4	3.8	0.4	0	0	0	0	
September passes per night:	5	0.6	36	5.6	286.8	7.8	0.2	6.8	0.8	2.4	
May passes per night:	0	0	0.6	0	84.4	0	0	0	0	0	

Key: Bb = western barbastelle, BLE = brown long-eared, Myo = Myotis species, Myo/Plec = Myotis or Plecotus species, not identifiable to species level, Unknown = not identifiable, Nn = noctule, Ppi = common pipistrelle, Ppy = soprano pipistrelle, Ppn = Nathusius' pipistrelle, PIP = Pipistrellus species not identifiable to species level, Nyc = Nyctalus species not identifiable to species level, Unknown = not identifiable.

12.4.73 The estimated population size in England and the occurrence in the region for each species identified during the activity surveys is provided in Table 12.9 below.

Table 12.9: Population size of species recorded

Species	Estimated England population size[37]	Description of occurrence locally and nationally[42]
Western barbastelle	Unknown	Relatively infrequent throughout the country and regionally
Brown long-eared bat	607,000	Common throughout the country and regionally
Noctule	565,000	Common throughout the country and regionally
Common pipistrelle	1,870,000	Common throughout the country and regionally
Soprano pipistrelle	2,980,000	Common throughout the country and regionally
Nathusius' pipistrelle	Unknown	Relatively infrequent throughout the country and regionally

12.4.74 Based on the bat activity surveys, it is noted that the highest recorded passes per night of barbastelle (five passes per night) are considered a small number according to this guidance. Additionally, predominantly widespread species were observed during the bat activity surveys. Furthermore, an assessment based on the UK Bat Mitigation Guidelines determined an importance score of 19 for the Western Site, which does not meet the threshold for county ecological significance.

12.4.75 Given that no barbastelle roosts likely to be present nearby due to the timing records and considering the habitats present and given that the species recorded during the activity surveys were predominately widespread species with a total importance score not meeting the threshold for county importance in accordance with the bat mitigation guidelines, the bat assemblage utilising the Eastern Site is considered to be up to district ecological importance.

Birds – Breeding and Wintering

12.4.76 The data search from TVERC returned records of several bird species within 2km of the Site. The closest record to the Western Site was of lapwing, located 0.04km south west of the Western Site, although the grid reference is accurate to 1km and therefore presence within the Site cannot be confirmed.

12.4.77 A total of 19 species of bird were recorded within the Western Site during the breeding bird surveys. The majority of species were relatively widespread, with four species on the BoCC Amber list and five species on the BoCC Red list recorded. Peak counts of farmland birds comprised: 2 grey partridge *Perdix perdix*, 1 linnet *Carduelis cannabina*, 14 skylark *Alauda arvensis*, and 8 yellowhammer *Emberiza citrinella*. Of the 14 skylark records, none were

confirmed breeding territories with 3 probable and 7 possible territories are considered to be present in accordance with BTO guidance, giving a maximum of 10 territories within the Western Site. The Western Site is surrounded by large areas of arable and grassland habitats in the wider landscape. Given this, and the intensively-managed nature of habitats within the Western Site with an absence of skylark plots or other low vegetation during the breeding season, the Western Site is considered unlikely to form optimal nesting habitat for skylark, which are likely to prefer arable and grassland habitats in the wider landscape. Considering this context in combination with the breeding bird survey results, the Site is considered likely to support a small breeding assemblage of farmland birds.

12.4.78 The Site is distant from any SPAs or Ramsar sites designated for populations of wintering bird species. Furthermore, the habitats within the site are unlikely to support significant assemblages of wintering birds which are not also present as breeding populations. Therefore, breeding bird surveys were considered sufficient and targeted wintering bird surveys are not considered necessary. The remainder of this ES Chapter therefore focusses on breeding birds although acknowledges that the majority of breeding bird species are likely to be present at the Site year-round.

12.4.79 Given the survey results, in addition to the types of habitats present and the intensive nature of agricultural practice at the Site (with defunct hedgerows, narrow field margins and no plots with short vegetation for ground-nesting birds), it is considered that the Western Site does not support an ecologically important assemblage of farmland bird species.

12.4.80 Overall, it is considered that the Western Site supports a small assemblage of breeding bird species including some farmland species. However, given the relatively low numbers of farmland birds recorded during the breeding bird surveys in addition to the sub-optimal habitats present on the Western Site and the prevalence of agricultural habitats within the wider landscape, the Western Site is assumed to contain a bird assemblage of district ecological importance.

Great crested newt

12.4.81 The data search from TVERC returned 39 records of GCN within 2km of the Site, with the closest record to the Western Site located approximately 1.5km southwest. The typical dispersal distance of GCN from breeding ponds is up to 250m, which may extend to 500m[40] in the absence of barriers to dispersal (such as major roads or fast-flowing watercourses) and therefore this record is well beyond typical dispersal distances and GCN present at this location are not considered to be able to access habitats within the Site.

12.4.82 Suitable terrestrial habitat for GCN (such as scrub, woodland and tussocky grassland) are limited in extent within the Site. Arable habitat is considered to be sub-optimal for GCN and there is limited connectivity between arable habitat within the Site and areas of optimal habitat in the wider landscape.

12.4.83 Waterbody WB1 present within the Eastern Site, located approximately 200m east of the Western Site, was found to be of 'poor' suitability for GCN on HSI assessment and is relatively isolated from suitable terrestrial habitat in the surrounding landscape. Therefore, GCN are assumed likely absent from waterbody WB1.

12.4.84 Three other waterbodies are present within 250m of the Western Site, hereafter referred to as waterbodies WB2, WB3 and WB4. These waterbodies were subject to HSI assessment, and waterbodies WB2 and WB3 were found to be of 'poor' suitability for GCN on HSI assessment. All waterbodies were found to be relatively isolated from areas of optimal GCN terrestrial habitat,

being primarily sited in residential or arable contexts. Waterbody WB4 was found to be of 'average' suitability on HSI assessment and was therefore subject to presence/likely absence survey, see below. All waterbody locations are shown in Appendix 12.4.

12.4.85 An eDNA survey to establish the presence / likely absence of GCN was completed on Waterbody WB4 and a negative result for GCN presence was returned following laboratory analysis. Therefore, GCN are assumed likely absent from this waterbody. Based on results of the HSI assessment and eDNA survey, GCN are considered likely absent from the Site and are therefore not considered further within this assessment.

Hazel dormouse

12.4.86 The data search from TVERC returned no records of hazel dormouse within 2km of the Site.

12.4.87 Evidence of hazel dormouse was identified in two locations in the south of the Western Site during hazel dormouse surveys, in the form of hazel dormouse nests. Possible hazel dormouse evidence was found in five other locations in the form of potential nests and a food cache. Evidence of wood mouse, a common and widespread mouse species, was also incidentally found in five locations. Hazel dormouse are therefore considered to be present within the Western Site.

12.4.88 Connectivity between the Western Site and optimal habitat for dormouse (generally considered to be woodlands of ten hectares or greater in size[Error! Bookmark not defined.]) is limited. The interior hedgerows of the Western Site contain large gaps limiting their connectivity to areas of woodland and making them sub-optimal for hazel dormouse. Given the limited evidence of hazel dormouse identified during surveys and considering that habitat context, it is considered that the population of hazel dormouse utilising the Western Site would be limited by the lack of hedgerow connectivity and intensively-managed nature of the hedgerows within the Site which are regularly flailed. It is likely that the large areas of optimal hazel dormouse habitat present in the wider landscape in the form of hedgerows and woodlands would be preferable to habitats within the Site. Therefore, the hazel dormouse population utilising the Western Site is considered to be of local ecological importance.

Reptiles

12.4.89 The data search from TVERC returned two records common lizard, located approximately 1.5km south of the Site.

12.4.90 Habitats present within the Western Site that are suitable for reptiles are limited to the central hedgerows and grassland margins and the boundary hedgerows which may provide some limited sheltering, foraging or basking opportunities. The arable habitat forming the majority of the Site is considered to be sub-optimal for reptiles and therefore the Western Site is unlikely to support large populations of reptiles. It is therefore assumed that any small populations of reptiles present would be formed of common and widespread species and would be of local ecological importance.

Other species

12.4.91 The habitats within the Western Site are not considered suitable to support any protected or notable species other than those discussed within this chapter.

Summary of Receptors and Sensitivity

12.4.92 Table 12.10 provides a summary of the ecological receptors and their associated sensitivity across the Site.

Table 12.10: Summary of Receptor Sensitivity

Receptor	Ecological Importance[17]	Sensitivity (Value)
The Site		
Designated sites		
Ardley Cutting and Quarry SSSI	National	High
Ardley Quarry BBOWT Reserve	Local	Low
Stoke Bushes LWS	County	Medium
Stoke Wood LWS	County	Medium
Stoke Little Wood LWS	County	Medium
Ardley Fields Quarry LWS	County	Medium
Upper Heyford Airfield LWS	County	Medium
Habitats		
Modified grassland	Negligible	Negligible
Hedgerows	Local	Low
Pond	Local	Low
Scrub	Negligible	Negligible
Trees	Local	Low
Ancient Woodland	County	Medium
Species		
[redacted]	[redacted]	[redacted]
Barn owl	Negligible	Negligible
Bats	District	Low
Breeding Birds	District	Low
Great crested newt	Negligible	Negligible
Hazel dormouse	Local	Low
Reptiles	Local	Low

12.5 Scheme Design and Management

12.5.1 The design of the Development has been iterative and, in accordance with policy and best practice guidance (NPPF 2023[43], and BS 42020:2013), has followed the 'mitigation hierarchy'. As such, the Development has been designed to avoid and retain the majority of important ecological features including the majority of boundary hedgerows and trees to ensure they can be managed long-term to maximise their biodiversity potential. Where this is not possible, new habitats including modified grassland, neutral grassland, trees, scrub and SuDS are proposed (as indicated on the Illustrative Masterplan, reference: 20005 – TP – 020, presented in Chapter 5: Description of Development) to compensate for habitat losses and to deliver overall biodiversity gain in conjunction with off-site provisions (see paragraphs 12.5.6-12.5.12).

12.5.2 The habitat creation and enhancement measures provided as part of the Development will ensure the Development will be compliant with relevant policies of the Cherwell Local Plan[10] and will also achieve biodiversity net gain in accordance with Core Policy 12 of the Cherwell Local Plan 2040 Consultation Draft[12] and the Environment Act 2021.

Enabling Works and Construction

12.5.3 Measures will be undertaken during the construction phase in order to minimise disruption and manage the effects of the Development such as implementation of a Construction Environmental Management Plan (CEMP) as embedded mitigation, including a suite of best practice construction measures. The CEMP will include the following measures:

- Habitats: All retained trees and hedgerows will be protected in accordance with BS 5837:2012[16];
- [redacted]
- Bats: In addition to removal under licence of any bat roosts found to be present within the trees not yet surveyed, sensitive lighting is to be employed throughout the enabling works and construction period. Lighting is to be avoided at night wherever possible and directional lighting will be used, avoiding lighting of retained habitat features;
- Nesting Birds: Removal of vegetation outside of the nesting bird season (March to August inclusive), or the supervision of vegetation removal by an ECoW should works take place within this period; and
- Hazel dormouse: In addition to a licence being obtained from Natural England in areas where works may harm or disturb hazel dormouse, the following measures will be implemented within the CEMP: Pre-construction survey, protection of existing hedgerows, and a method statement to avoid any disturbance to hazel dormouse (if required following the pre-construction survey).

12.5.4 Retention and protection of the existing boundary hedgerows will be inherent within the Development at the construction phase (see Parameter Plans in Appendix 5.1), except where areas of removal are required to facilitate access points in the north of the Site. Native tree and shrub planting throughout areas of retained habitat and off-site habitat creation will be provided as additional mitigation.

Completed Development

12.5.5 Retained and planted vegetation will continue to be retained and managed during the completed development phase. As additional mitigation, a detailed Habitat Management and Monitoring Plan ('HMMP') will be prepared and submitted to CDC prior to operation of the Development. The HMMP will describe measures to maximise the biodiversity potential of retained and newly created habitats through appropriate management, as well as a programme of monitoring to provide a mechanism to modify the management prescriptions if required. Measures relevant to protected and priority fauna will be appended to the HMMP. It is anticipated the HMMP will be secured via a planning condition.

Biodiversity Net Gain

12.5.6 In accordance with consultation responses from CDC in addition to policies within the adopted and emerging Local Plans, a Biodiversity Net Gain (BNG) assessment has been completed to ensure a minimum 10% net gain in biodiversity can be achieved (see Appendix 12.3a and 12.3b).

12.5.7 The Defra Statutory Biodiversity Metric Calculation Tool[44] (hereafter 'the BNG metric') was used to calculate the pre-development and predicted post-development biodiversity value of the Site based on the illustrative masterplans plans for the Site and off-site habitat provision.

12.5.8 The calculation utilised the baseline habitats and conditions identified during the updated UK habitat survey completed in September 2023. This calculation is completed separately for non-linear and linear habitats and results are generated respectively. The BNG assessment was completed in accordance with relevant guidance[21,45,46]. A summary of the completed BNG metric results are provided in Appendix 12.3a and 12.3b, with plans illustrating the on-site and off-site post-intervention provided in Appendix 12.3c and 13.3d, respectively.

12.5.9 The BNG metric operates by calculating the number of biodiversity units associated with a particular habitat type (both pre-and post-development) – the 'unit' value associated with each habitat type is calculated based on the following parameters:

- Size (in hectares)/Length (in km);
- Distinctiveness (i.e. how rare/valuable a given habitat is);
- Condition (i.e. how well the recorded habitat fits (or will fit) the standardised description of that habitat);
- Strategic significance (i.e. if the existing or proposed habitat is within an area formally adopted in the local plan for green infrastructure or biodiversity improvements);

12.5.10 When considering the creation of new habitats in the post-development site, other factors are also considered when calculating the 'unit' value of a given habitat and these are:

- Time to reach the target condition of each habitat including any advanced or delayed creation; and
- Difficulty category for the creation of a given habitat.

12.5.11 An area of off-site habitat compensation will be created, comprising approximately 20ha of arable land at baseline and located in Piddington, south east of Bicester. This land parcel is under the Applicant's ownership, and it is anticipated that compensatory habitat provision will be secured through a section 106 agreement. The calculation for the off-site area utilised the baseline habitats and conditions identified during the updated UK habitat survey completed in September 2023.

12.5.12 As shown in Appendix 12.3a and 12.3b, following implementation of both on-site and off-site habitat creation and enhancement, it is anticipated that the Development will be able to achieve a net gain of over 10% with initial calculations resulting in an +10.26% net gain in habitat units and an +11.48% gain in hedgerow units at the Eastern Site and a +16.55% net gain in habitat units and a +11.04% net gain in hedgerow units at the Western Site. This assumes the creation of 18.73ha of neutral grassland and 1.55km of hedgerows at the Piddington site in addition to on-site creation of modified grassland, neutral grassland, swales, urban tree, mixed scrub, introduced shrub and hedgerow habitats where possible (as shown on Parameter Plans TP004 and TP010: Vegetation Retention and Removal). The completed BNG matrices are set out in

Appendix 12.3a and 12.3b and will be updated as the detailed design is developed, with a final BNG metric submitted at the reserved matters stage.

12.5.13 A separate HMMP will be produced detailing the habitat management requirements for off-site created habitats and, as with the HMMP for the Site, it is anticipated both the requirement for each application site (Eastern Site and Western Site) to achieve a 10% net gain in biodiversity units and a HMMP will be secured via a planning condition, in accordance with relevant legislation[2] and planning policy[10,12,43].

12.6 Enabling Works and Construction

Assessment of Effects

12.6.1 An assessment of effects on important ecological receptors (considered to be those of local or greater ecological importance) is discussed below.

Enabling Works

12.6.2 It is assumed that most site clearance works on the Western Site will be completed during the Enabling Works and therefore the assessment for the construction phase of the Western Development set out below also applies to the Enabling Works.

Eastern Development

Statutory and Non-statutory Designated sites

12.6.3 Given the distance between the designated sites identified within 2km (both Ardley Cutting and Quarry SSSI and the non-statutory designated sites) and the Eastern Site and lack of habitat connectivity between these designated sites and the Eastern Site, no direct effects are considered likely as a result of the Eastern Development. No indirect effect pathways have been identified due to the distance between the Eastern Site and the designated sites, the lack of hydrological connectivity and the scale and nature of the Development.

12.6.4 Construction traffic is anticipated to be well below 1,000 AADT (at up to 190 vehicles, of which 40 are HGVs) and will be and short-lived in nature. Therefore, no adverse effects are anticipated on designated sites as a result of air quality changes from construction traffic (i.e. a negligible effect).

12.6.5 It is therefore concluded that construction of the Eastern Development will result in an insignificant (negligible) effect on the structure or function of designated sites for grassland habitats only.

Habitats

Hedgerows

12.6.6 Construction will require the removal of the defunct species-poor hedgerows within the centre of the Eastern Site, H12 and H13. Hedgerows forming the boundary of the Eastern Site will be retained except for removal of one section of hedgerow H9 (approximately 185m in length) to facilitate an access point on the northern boundary of the Eastern Site. The remaining boundary hedgerows will be retained during construction and protected through measures adhering to BS5837:2012 that will be detailed in the CEMP. Factors important to the conservation status of hedgerows include the maintenance of their extent and connectivity with woodland and other hedgerows in the surrounding landscape. In the absence of mitigation, the permanent but partial

loss and fragmentation of hedgerows as a result of construction of the Eastern Development will result in a minor adverse effect which will be significant at the local level.

Ponds

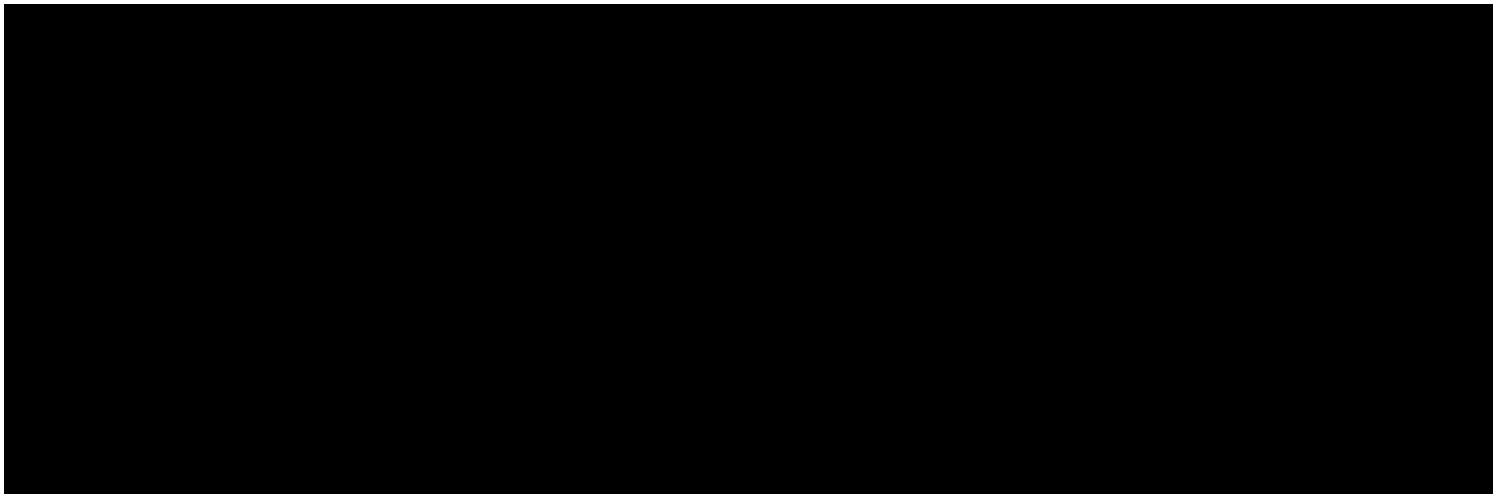
12.6.7 Construction will require the removal of waterbody WB1 within the Eastern Site. In the absence of mitigation, the permanent removal of a pond as a result of construction of the Eastern Development will result in a permanent minor adverse effect that will be significant at the local level.

Trees

12.6.8 Construction will result in the loss of three ash trees T30, T31 and T32 within hedgerow H9 to facilitate an access point. Ash is a common and widespread species in the wider landscape. The remaining trees located on the boundaries of the Eastern Site will be retained during construction and protected through measures adhering to BS5837:2012 that will be detailed in the CEMP. However, in the absence of mitigation, the permanent removal of trees as a result of construction of the Eastern Development will result in a permanent minor adverse effect that will be significant at the local level.

Species

12.6.9 Species or species groups relevant to the assessment of potential construction phase effects of the Eastern Development are described below.



Bats

12.6.15 The majority of trees which are considered to be suitable for roosting bats on the boundaries of the Eastern Site will be retained as part of construction works. Removal of three low suitability trees (T30, T31 and T32) will be completed by soft-felling under the supervision of an ECoW with these measures set out in the CEMP.

12.6.16 Lighting associated with construction has the potential to result in disturbance to any bat assemblage associated with the Eastern Site. This could include bats being dissuaded from using retained / newly created foraging and commuting habitat.

12.6.17 Hedgerows where the highest levels of bat activity were identified during the bat activity transect surveys are to be retained. The partial removal of hedgerow H9 and removal of three trees on the northern boundary of the Eastern Site may result in loss or fragmentation of habitats which may be utilised by commuting or foraging bats.

12.6.18 Overall, in the absence of mitigation, it is considered that enabling works and construction of the Eastern Development could result in an adverse effect on the bat assemblage associated with the Eastern Site. However, given activity levels were comparatively low along hedgerow H9 (see Appendix 12.4), it is assumed only a small proportion of the total bat assemblage (considered to be of up to district ecological importance) would be affected by the hedgerow removal. It is also considered likely that bats utilising hedgerow H9 could seek alternative commuting and foraging routes around the boundaries of the Site or in the local area. Therefore, in the absence of mitigation, it is assumed that a significant effect at up to local level may occur.

Birds

12.6.19 Hedgerows and trees on the boundaries of the Eastern Site which may be used by nesting birds will be retained. Internal hedgerows H12 and H13 will be removed as part of the Enabling Works to facilitate construction. Approximately 22 ha of arable habitat will be removed which is considered to provide sub-optimal foraging and nesting opportunities for farmland birds such as skylark.

12.6.20 Site clearance activities could result in the disturbance and destruction of nests and juvenile birds if carried out during the active nesting season which would trigger relevant legislation under the Wildlife and Countryside Act 1981 (as amended). The CEMP will include measures to mitigate this risk including limiting vegetation clearance to outside of the nesting season or necessitating the supervision of clearance activity if this is unavoidable.

12.6.21 In the absence of mitigation, the loss of arable, grassland and hedgerow habitats would result in a permanent moderate adverse effect on small numbers of breeding farmland birds present at the Eastern Site which would be significant at a local level. Therefore, in the absence of mitigation, it is assumed that a significant effect at up to local level may occur.

Hazel dormouse

12.6.22 No evidence of hazel dormouse was identified during the hazel dormouse survey within the Eastern Site and, given the lack of habitat connectivity between the Eastern Site and the Western Site and areas of optimal dormouse habitat, hazel dormouse are considered likely absent from the Eastern Site. Therefore, a negligible effect is anticipated on hazel dormouse as a result of the Eastern Development.

12.6.23 In the unlikely event that hazel dormouse or evidence of their presence was identified during the pre-construction survey, a licence from Natural England would be obtained prior to hedgerow removal.

Reptiles

12.6.24 Construction of the Eastern Development will result in the loss of arable, improved grassland and defunct species-poor hedgerows which are sub-optimal for reptiles although reptiles may utilise these habitats in low numbers. It is therefore assumed that common and widespread reptile species may be present in low numbers.

12.6.25 Best practice measures will be set out in the CEMP which are considered to ensure compliance with legislation protecting reptiles including:

- Pre-construction walkover survey and a hand-search of any log / brash piles by an ecologist prior to removal;
- Soft-start of vegetation clearance machinery to allow any reptiles to move away from the area;
- Construction works limited to daylight hours;
- [redacted]
- Careful storage of topsoil / regular inspections.

12.6.26 Given the sub-optimal habitats present, it is assumed that, in the absence of mitigation, the loss of these habitats would result in a negligible effect on the conservation status of reptile species potentially associated with the Eastern Development.

Western Development

Statutory and Non-statutory Designated sites

12.6.27 Given the distance between the designated sites identified within 2km (both Ardley Cutting and Quarry SSSI and the non-statutory designated sites) and the Western Site and lack of habitat connectivity between these designated sites and the Western Site, no direct effects are considered likely as a result of the Western Development. No indirect effect pathways have been identified due to the distance between the Western Site and the designated sites, the lack of hydrological connectivity and the scale and nature of the Development.

12.6.28 Construction traffic is anticipated to be well below 1000 AADT (at up to 190 vehicles, of which 40 are HGVs) and will be temporary in nature. Therefore, no adverse effects are anticipated on designated sites because of air quality changes from construction traffic (i.e. a negligible effect).

12.6.29 It is therefore concluded that the Enabling Works and construction of the Western Development will result in an insignificant (negligible) effect on the structure of function of designated sites.

Habitats

Hedgerows

12.6.30 Construction will require the removal of the defunct species-poor hedgerows within the centre of the Site, H3, H4, H5 and H6. Hedgerows forming the boundary of the Western Site will be retained except for removal of one section of hedgerow H8 (approximately 330m in length) to facilitate an access point on the northern boundary of the Western Site. The remaining hedgerows will be retained during construction and protected through measures adhering to BS5837:2012 that will be detailed in the CEMP. Factors important to the conservation status of hedgerows include the maintenance of their extent and connectivity with woodland and other hedgerows in the surrounding landscape.

12.6.31 The permanent but partial loss and fragmentation of hedgerows because of the Enabling Works and construction of the Western Development will result in a minor adverse effect which will be significant at the local level.

Trees

12.6.32 Construction will result in the loss of approximately seventeen ash, pedunculate oak and field maple trees T7-T23 within hedgerow H8 to facilitate an access point. These are common and widespread species in the wider landscape. The remaining trees located on the boundaries of the Western Site will be retained during construction and protected through measures adhering to BS5837:2012 that will be detailed in the CEMP. However, in the absence of mitigation, the permanent removal of trees as a result of the Enabling Works and construction of the Western Development will result in a permanent minor adverse effect that will be significant at the local level.

Species

12.6.33 Species or species groups relevant to the assessment of potential construction phase effects of the Western Development are described below.

[redacted]

Bats

12.6.36 The majority of trees which are considered to be suitable for roosting bats on the boundaries of the Western Site will be retained as part of the Western Development. Removal of low suitability trees on the northern boundary of the Site will be soft-felled and will be completed under the supervision of an ECoW with these measures set out in the CEMP.

12.6.37 Removal of tree T1 and building B1 is anticipated to have a negligible effect on roosting bats as, based on emergence/re-entry survey results, roosting bats are considered likely absent from tree T1 and building B1. T19, T4 and T5 will be subject to further checks prior to works commencing.

12.6.38 Lighting associated with construction has the potential to result in the potential disturbance to any bat assemblage associated with the Western Site. This could include bats being dissuaded from using retained/newly created foraging and commuting habitat.

12.6.39 Hedgerows where the highest levels of bat activity were identified during the bat activity transect surveys are to be retained. The partial removal of hedgerow H8 and approximately 17 trees on the northern boundary of the Site may result in loss or fragmentation of habitats which may be utilised by commuting or foraging bats.

12.6.40 Overall, in the absence of mitigation, it is considered that the Enabling Works and construction of the Western Development could result in an adverse effect on the bat assemblage associated with the Western Site. However, given activity levels were comparatively low along hedgerow H8 (see Appendix 12.4), it is assumed only a small proportion of the total bat assemblage (assumed to be of up to district ecological importance on a precautionary basis) would be affected by the hedgerow removal. It is also considered likely that bats utilising hedgerow H8 could seek alternative commuting and foraging routes around the boundaries of the Site or in the local area. Therefore, in the absence of mitigation, it is assumed that a significant effect at up to local level may occur.

Breeding Birds

12.6.41 Hedgerows and trees on the boundaries of the Western Site which may be used by nesting birds will be retained. Internal hedgerows H3-H6 will be removed to facilitate construction. Approximately 41ha of arable habitat will be removed which is considered to provide sub-optimal foraging and nesting opportunities for farmland birds such as skylark.

12.6.42 Site clearance activities could result in the disturbance and destruction of nests and juvenile birds if carried out during the active breeding season which would trigger relevant legislation under the Wildlife and Countryside Act 1981 (as amended). It is envisaged that the CEMP will include measures to mitigate this risk including limiting vegetation clearance to outside of the nesting season or necessitating the supervision of clearance activity if this is unavoidable.

12.6.43 In the absence of mitigation, the loss of arable, grassland and hedgerow habitats would result in a permanent moderate adverse effect on small numbers of breeding farmland birds present at the Western Site which would be significant at a local level. Therefore, in the absence of mitigation, it is assumed that a significant effect at up to local level may occur.

Hazel dormouse

12.6.44 Hedgerows which are considered to be most suitable for hazel dormouse are those located on the boundaries of the Western Site with connectivity to the wider landscape. These boundary hedgerows will be retained as part of the works and will be buffered from development by retained grassland and tree planting. Removal of the central, defunct species-poor hedgerows is considered to have little effect on the hazel dormouse population due to the hedgerows' lack of connectivity to optimal habitat in the wider landscape in addition to their species-poor composition.

12.6.45 One section of Hedgerow H8 (approximately 330m in length) is to be removed to facilitate an access point on the northern boundary of the Western Site. No evidence of hazel dormouse use was found within hedgerow H8 during the hazel dormouse survey.

12.6.46 The hazel dormouse survey found evidence of hazel dormouse presence in the form of two nests located in the southwest of the Western site, along the southern part of hedgerow H2. Only possible hazel dormouse evidence was recorded within the central hedgerows H4 and H6 with possible presence also in H1 along the western boundary of the site. However, it is assumed that all contiguous habitat to H2 supports hazel dormouse on a precautionary basis. Hedgerow H2 and the majority of hedgerows are being retained and buffered as part of the Development. In order to ensure legal compliance in relation to hazel dormouse, a mitigation licence will be obtained from Natural England prior to hedgerow removal of the section of hedgerow H8 due to the possible removal of hazel dormouse resting places or direct harm to hazel dormouse. As part of the licence application, a method statement will be prepared to minimise adverse effects on hazel dormouse.

12.6.47 Best practice measures will form part of the CEMP, including a pre-construction survey by a licenced ECoW prior to removal of the hedgerows. Best practice construction measures will be set out in the CEMP to avoid lighting disturbance to the retained hedgerows during construction.

12.6.48 Although hedgerows most suitable for hazel dormouse and habitat connectivity are being retained, evidence of hazel dormouse presence was identified within the site. Therefore, in the absence of mitigation, the Enabling Works and construction of the Western Development may result in a minor adverse effect on hazel dormouse, significant at the local level due to loss of hedgerow habitat. Hedgerow planting will be completed within the site to compensate for the hedgerow loss.

Reptiles

12.6.49 Construction will result in the loss of arable, improved grassland and defunct species-poor hedgerows which are sub-optimal for reptiles although reptiles may utilise these habitats in low numbers. It is therefore assumed that common and widespread reptile species may be present in low numbers.

12.6.50 Given the sub-optimal habitats present, it is assumed that, in the absence of mitigation, the loss of these habitats from the Enabling Works and construction would result in a negligible effect on the conservation status of reptile species potentially associated with the Western Development.

Development

12.6.51 Site clearance has potential to cause adverse effects significant at the local level on ponds, hedgerows, bats, and hazel dormouse.

12.6.52 Vegetation clearance during the Enabling Works and construction phases may cause adverse significant effects at the local level for farmland birds.

12.6.53 No other effects are anticipated as a result of construction of the Development.

Mitigation, Monitoring and Residual Effects

12.6.54 The mitigation and compensation measures described below address the effects that have been identified as being significant during the construction impact assessment. Where the likely effects are considered to be negligible, no mitigation is required, and they are therefore not considered further in the assessment.

Eastern Development

Ponds

12.6.55 Swales are to be provided within the Eastern Development. However, it is likely that these will remain dry for most of the year. Therefore, a pond will be provided within the off-site compensation area at Piddington to compensate for the loss of pond WB1. This pond will be designed to provide greater ecological value than pond WB1 by incorporating a range of native species planting and containing water for the majority or all of the year.

12.6.56 Given the distance to the compensation area from the Site, it is considered that a residual adverse effect of the local level remains following the implementation of the above mitigation measures.

Trees

12.6.57 Native tree planting will take place throughout the Eastern Development. Planting will comprise a mixture of native species and is considered to provide a greater number of trees than those removed. Once established, it is considered that this replacement planting will more than compensate for the loss of trees as part of the Western Development. Therefore, it is anticipated that the residual effect on trees will be negligible.

Hedgerows

12.6.58 Replacement hedgerow planting will be completed close to the area of hedgerow loss on the northern boundaries of the Eastern Site. Once established, it is considered that this replacement hedgerow planting will compensate for the loss of hedgerow habitat and will help to maintain connectivity throughout the Eastern Development and to the wider landscape. Further hedgerow planting will be completed at the off-site compensation area at Piddington. Replacement hedgerow planting will be of a mixture of native shrub species such as hawthorn, blackthorn, hazel, elder and dog rose and is therefore considered likely that replacement hedgerows will be of greater ecological value than the defunct, species-poor hedgerows to be removed. Following implementation of these measures, it is anticipated that the residual effect on hedgerow habitat will be negligible.

Bats

12.6.59 To compensate for the partial loss of hedgerow H9, new hedgerow planting will be completed in the north of the Eastern Site. This will help to maintain linear habitat connectivity along the northern boundary of the Eastern Site and additional tree and hedgerow planting off-site will provide additional foraging and commuting opportunities for bats. Furthermore, the creation of neutral grassland, swales, planted trees, scrub and woodland habitat on-site will provide further foraging opportunities for bats.

12.6.60 Enabling works and construction are to take place during daylight hours with lighting of retained and newly created habitats to be minimised by measures set out within a CEMP. Therefore, no adverse effects are anticipated in relation to construction lighting.

12.6.61 Although replacement hedgerow planting will be completed, the newly planted hedgerows will take time to become fully established and therefore a temporary adverse effect is anticipated. However, given the low levels of bat activity recorded on hedgerow H8, partial removal of this hedgerow is anticipated to effect only small numbers of bats, which are likely to be able to take

alternative routes through the landscape temporarily. Therefore, a residual temporary adverse effect significant at up to the local level is anticipated until new hedgerow planting is established.

Birds

12.6.62 Grassland and hedgerow habitat provision off-site at Piddington is considered likely to provide alternative enhanced habitat for birds that may be utilise habitats within the Eastern Development such as skylark, yellowhammer and linnet. It is anticipated that scrapes can be created which will provide suitable habitat for lapwing while the grassland will provide suitable habitat for skylark to nest. Replacement hedgerow planting close to the areas of hedgerow loss in the north of the Eastern Site will help to maintain habitat connectivity and minimise the loss of hedgerow habitats that birds may utilise for nesting.

12.6.63 Given the loss of large areas of arable and hedgerow habitats within the Eastern Site, and the distance to the off-site habitat compensation proposed, it is considered likely that birds associated with the Eastern Site may be displaced to other suitable habitat, such as that provided off-site as a result of the Development. Therefore, a residual permanent minor adverse effect, significant at a local level, is assumed to remain following the implementation of mitigation measures.

Hazel dormouse

12.6.64 Hazel dormouse are considered likely absent from the Eastern Site and therefore no mitigation or compensation measures are considered necessary. It is therefore considered that the Eastern Development will result in a negligible effect on hazel dormouse.

Western Development

Trees

12.6.65 Native tree planting will take place throughout the Western Site. Planting will comprise a mixture of native species and is considered to provide a greater number of trees than those removed. Once established, it is considered that this replacement planting will more than compensate for the loss of trees as part of the Western Development. Therefore, it is anticipated that the residual effect on trees will be negligible.

Hedgerows

12.6.66 Replacement hedgerow planting will be completed close to the area of hedgerow loss on the northern boundaries of the Western Site. Once established, it is considered that this replacement hedgerow planting will compensate for the loss of hedgerow habitat and will help to maintain connectivity throughout the Western Development and to the wider landscape. Further hedgerow planting will be completed at the off-site compensation area at Piddington. Replacement hedgerow planting will be of a mixture of native shrub species such as hawthorn, blackthorn, hazel, elder and dog rose and is therefore considered likely that replacement hedgerows will be of greater ecological value than the defunct, species-poor hedgerows to be removed. Following implementation of these measures, it is anticipated that the residual effect on hedgerow habitat will be negligible.

Bats

12.6.67 Removal of moderate tree T19 or disturbance to moderate suitability trees T4 and T5, will be completed in compliance with relevant legislation and through a BLICL if required. The BLICL

ensures bats are appropriately removed from the roost and alternative roost provision in the form of bat boxes will be provided if necessary.

12.6.68 To compensate for the partial loss of hedgerow H8, new hedgerow planting will be completed in the north of the Western Site. This will help to maintain linear habitat connectivity along the northern boundary of the Western Site and additional tree and hedgerow planting off-site will provide additional foraging and commuting opportunities for bats. Furthermore, the creation of neutral grassland, swales, planted trees, scrub and woodland habitat on-site will provide further foraging opportunities for bats.

12.6.69 Enabling Works and construction are to take place during daylight hours with lighting of retained and newly created habitats to be minimised by measures set out within a CEMP. Therefore, no adverse effects are anticipated in relation to construction lighting.

12.6.70 Although replacement hedgerow planting will be completed, the newly planted hedgerows will take time to become fully established and therefore a temporary adverse effect is anticipated. However, given the low levels of bat activity recorded on hedgerow H8, partial removal of this hedgerow is anticipated to effect only small numbers of bats which are likely to be able to take alternative routes through the landscape temporarily. Therefore, a residual temporary adverse effect significant at the local level is anticipated until new hedgerow planting is established.

Birds

12.6.71 Grassland and hedgerow habitat provision off-site at Piddington is considered likely to provide alternative enhanced habitat for birds that may be utilise habitats within the Western Development such as skylark, yellowhammer and linnet. It is anticipated that scrapes can be created which will provide suitable habitat for lapwing while the grassland will provide suitable habitat for skylark to nest. Replacement hedgerow planting close to the areas of hedgerow loss in the north of the Western Development will help to maintain habitat connectivity and minimise loss of hedgerow habitats which birds may utilise for nesting.

12.6.72 The Development involves removal of arable habitat and hedgerow removal within the Western Site. It is considered likely that birds associated with the Western Site may be displaced to other suitable habitat, such as that provided off-site as a result of the Development. Alternative habitat will be provided within the district at Piddington. Therefore, a residual permanent minor adverse effect significant at the local level is assumed to remain following the implementation of mitigation measures.

Hazel dormouse

12.6.73 Replacement hedgerow planting will be completed close to the area of hedgerow loss on the northern boundaries of the Western Development. Once established, it is considered that this replacement hedgerow planting will compensate for the loss of hedgerow habitat for any hazel dormouse present and will maintain habitat connectivity. It is considered that the licence method statement will contain measures such as a pre-construction survey by an ECoW which will prevent the loss of individual hazel dormouse during hedgerow removal.

12.6.74 It is therefore considered that, following implementation of the above measures, the Development will result in a negligible effect on hazel dormouse.

Development

12.6.75 Following the implementation of mitigation measures, no significant effects are anticipated as a result of the Development except in relation to birds for which a residual minor adverse effect significant at the local level is anticipated.

12.6.76 The habitat creation and enhancement measures are considered to ensure the Development is compliant with relevant policies of the Local Plan[10] as well as relevant policies in the 2040 consultation draft local plan[12]. This includes the enhancement and creation of new habitats that will link up with adjacent habitats to form wildlife corridors.

12.6.77 A summary of residual effects is provided in Table 12.12.

12.7 Completed Development

Assessment of Effects

12.7.1 The potential effects are considered in the absence of mitigation measures which are provided separately below.

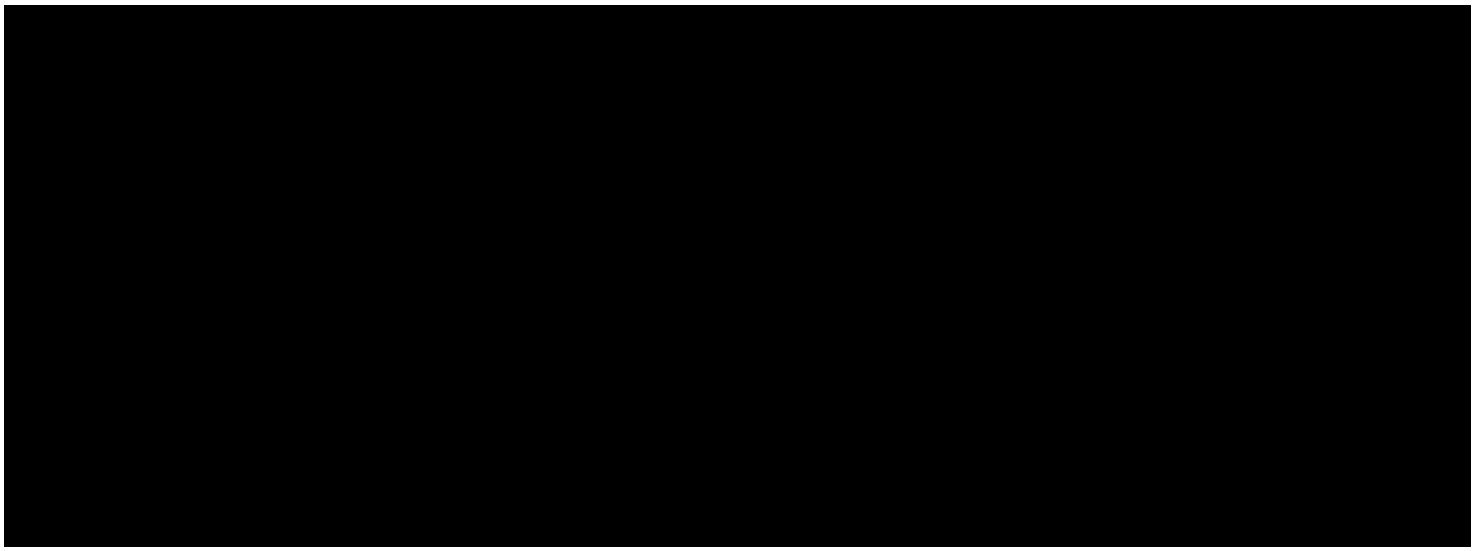
12.7.2 An assessment of effects at the completed development stage is provided below. Only ecological features that are assessed as potentially being subject to significant effects as a result of the completed development are described.

Eastern Development

Statutory and Non-statutory Designated sites

12.7.3 Due to the employment-focused nature of the Eastern Development and the distance from designated sites, the likelihood of increased recreational pressure affecting these sites is minimal. Apart from potential air quality impacts discussed below for the Development, no other pathways for direct or indirect effects on designated sites have been identified due to the nature of the Eastern Development and its distance from these sites.

Species



Bats

12.7.7 As set out within the Lighting Assessment for the Development (see Appendix 5.5), lighting associated with the completed Eastern Development has the potential to result in disturbance to any bat assemblage associated with the Site. This could include bats being dissuaded from using retained / newly created foraging and commuting habitat. In the absence of mitigation, this could result in an adverse effect on the conservation status of the bat assemblage associated with the Eastern Site. In the absence of mitigation, this could have a significant adverse effect at up to the district level.

Birds

12.7.8 Lighting and noise disturbance associated with the completed Eastern Development has the potential to result in disturbance to nesting birds which may be associated with the retained habitats or boundary hedgerows. It is considered that these species will be predominately

common and widespread and, given that the boundary hedgerows will be retained with a buffer of grassland and tree planting, no significant effects on breeding bird assemblages or the conservation status of bird species is anticipated for the completed Eastern Development (i.e. negligible).

Hazel dormouse

12.7.9 Hazel dormouse are considered likely absent from the Eastern Site based on desk study and survey results and therefore, a negligible effect is anticipated as a result of the Eastern Development.

Western Development

Statutory and Non-statutory Designated sites

12.7.10 Due to the employment nature of the Western Development and the distance between the Western Site and designated sites, the likelihood of increased recreational pressure adversely effecting statutory or non-statutory designated sites is negligible. No other pathways for direct or indirect effects on designated sites, other than those in relation to air quality effects on Ardley Cutting and Quarry SSSI, which are discussed below, have been identified due to the employment nature of the Western Development and the distance between the Western Site and designated sites.

12.7.11 Potential for effects as a result of changes to air quality are discussed in relation to the Development below.

12.7.12 No other pathways for direct or indirect effects on designated sites have been identified due to the employment nature of the Western Development and the distance between the Western Site and designated sites.

Habitats

12.7.13 Based on the air quality assessment detailed in Appendix 9.8, potential pollutant increases associated with the entire Development were evaluated. The air quality-related effects anticipated for the Western Development mirror those assessed for the 'Eastern Development' . Consequently, it is concluded that the Western Development alone will have an insignificant and imperceptible effects on habitats on-site.

12.7.14 No other pathways for direct or indirect effects have been identified due to the employment nature of the Western Development and the distance between the Western Site and designated sites.

[redacted]

[redacted]

Bats

12.7.18 Lighting associated with the completed Western Development has the potential to result in disturbance to any bat assemblage associated with the Site. This could include bats being dissuaded from using retained / newly created foraging and commuting habitat. In the absence of mitigation, this could result in a significant adverse effect on the county level.

12.7.19 Detailed lighting design would come forward in line with the principles defined in the Development Specification and external lighting strategy (submitted as a standalone document with the planning applications) through Reserved Matters application.

Birds

12.7.20 Lighting and noise disturbance associated with the completed Western Development has the potential to result in disturbance to nesting birds which may be associated with the retained habitats or boundary hedgerows. It is considered that these species will be predominately common and widespread and, given that the boundary hedgerows will be retained with a buffer of grassland and tree planting, no significant effects on breeding bird assemblages or the conservation status of bird species is anticipated for the completed Western Development stage (i.e. negligible).

Hazel dormouse

12.7.21 Lighting associated with the completed Western Development has the potential to result in disturbance to any hazel dormouse associated with the hedgerows forming the boundary of the Western Site. This could include hazel dormouse being dissuaded from using retained hedgerows. Although habitats are sub-optimal for hazel dormouse, on a precautionary basis it is considered that, in the absence of mitigation, operational lighting would result in a minor adverse effect on hazel dormouse if present within the Western Site, which may be significant at the local level.

Development

12.7.22 In the absence of mitigation, a minor adverse effect, significant at the local level, could occur on bats and hazel dormouse caused by light spill from the completed Development on habitat features used by these species.

Air Quality Effects

12.7.23 An air quality assessment of the potential impacts to designated sites has been undertaken for both the Eastern and Western Developments combined, and this is presented in full in Appendix 9.8: Biodiversity Air Quality Modelling Assessment. The findings of that assessment are referred to here in respect of the potential for significant ecological impacts of both developments.

12.7.24 The following designated sites are located within the 200m of the ARN, and, in accordance with Institute of Air Quality Management (IAQM) guidance, were therefore screened into the assessment:

- Ardley Cutting and Quarry SSSI (intersected by the B430) (grassland habitats only within 200m);
- Ardley Cutting and Quarry SSSI (intersected by the M40) (grassland habitats only within 200m);
- Stoke Little Wood Ancient woodland / LWS (adjacent to the B1400); and
- Twelve Acre Copse Ancient woodland / LWS (adjacent to the B1400).

12.7.25 Appendix 9.8: Biodiversity Air Quality Modelling Assessment sets out that thresholds beyond which a significant harmful effect could occur on the given receptors are known as critical loads (CLo) and critical levels (CLe). These are taken from Air Pollution Information System (APIS)[47] for woodland habitats and from JNCC guidelines for grassland habitats[48].

12.7.26 For the woodland LWSs, APIS thresholds of CLo and CLe for broadleaved deciduous woodland have been used, in accordance with guidance published by the Woodland Trust[49]:

- Nitrogen Oxides (NO_2): A CLe of 30 µg/m^3 annual mean and 75 µg/m^3 24-hour mean;
- Nitrogen Deposition: A CLo of 10kg N/ha/yr; and
- Ammonia: A CLe of 1 µg/m^3[v].

12.7.27 For the SSSI, thresholds have been based on the designated habitat of *Bromus Erectus - Brachypodium Pinnatum* Lowland Calcareous grassland, though the ammonia CLe used reflects that used for the woodland LWSs above:

- Nitrogen Oxides (NO_2): A CLe of 30 µg/m^3 annual mean and 75 µg/m^3 24-hour mean;
- Nitrogen Deposition: A CLo of 10kg N/ha/yr; and
- Ammonia: A CLe of 1 µg/m^3.

12.7.28 NE and IAQM guidance outlines screening criteria for air quality impacts. According to this guidance, exceedance of a threshold of 1% of CLo or CLe for designated sites is used to determine where more detailed assessment of potential effects is required. For road traffic emissions related to a development, the Design Manual for Roads and Bridges guidance uses 1000 Annual Average Daily Traffic (AADT) movements as a proxy for the 1% threshold[50]. Natural England guidance[51] broadly supports the use of these thresholds for assessment purposes and states: *'The AADT thresholds and 1% of critical load/level are considered by Natural England's air quality specialists … to be suitably precautionary, as any emissions below this level are … considered to be imperceptible'.*

12.7.29 It should be noted that exceeding this 1% threshold does not necessarily indicate an effect, it merely signals the need for further assessment.

12.7.30 Impacts have been predicted at selected receptors within several transects, which represent the locations within the designated sites perpendicular to the road, distances of 2 m, 3 m, 5 m, 9 m, 17 m, 33 m, 65 m, 129 m and 200 m from the road. Transect locations are shown in Figure 2:

[v] The CLe of 1 µg/m^3 applies to woodlands where sensitive lichens and bryophytes are an important part of the ecosystem integrity and otherwise is set at 3 µg/m^3.

Transect and Receptor Locations in Appendix 9.8: Biodiversity Air Quality Modelling Assessment.

12.7.31 Existing background pollutant concentrations at the designated sites screened into the assessment, together with relevant CLe and CLo are summarised from Appendix 9.8: in Tables 12.11 and 12.12, respectively (data taken from Appendix 9.8: Biodiversity Air Quality Screening Assessment). Table 12.11 shows how NOx levels are well below the CLe at both sites, though for ammonia the 1 µg/m^3 CLe is already exceeded for all sites. Table 12.12 shows how existing background nitrogen deposition rates already exceed the CLo at all three sites, while acid deposition rates remain below the CLo at all sites.

Table 12.11: Estimated Annual Mean Background Pollutant Concentrations (µg/m^3)

Pollutant	Site	CLe
Ardley Cutting and Quarry SSSI		
NOx	9.8 – 15.3	30
NH_3	1.8 – 2	1
Stoke Little Wood and Twelve Acre Copse LWS		
NOx	8.9	30
NH_3	1.8 – 1.9	1

Table 12.12: Estimated Annual Mean Background Pollutant Concentrations (µg/m^3)

Pollutant	Site	CLo
Ardley Cutting and Quarry SSSI		
Nutrient Deposition	16.9-17.2	10
Acid Deposition	1.2	4.856
Stoke Little Wood LWS and Twelve Acre Copse LWS		
Nutrient Deposition	29.4 – 29.5	10
Acid Deposition	2.1	10.871/10.942

12.7.32 Table 12.13 summarises the findings of the air quality assessment of the Eastern and Western Developments combined. This shows where the process contribution (PC) of the Development alone as well as in-combination with other developments (see later) would exceed the 1% threshold for CLo and CLe for assessed pollutants. Where the 1% threshold is exceeded, the maximum Predicted Environmental Concentration (PEC)[vi] is also shown, as a percentage of the CLo and CLe for assessed pollutants.

12.7.33 While the PEC is >100% of the CLo and CLe in several tested pollutants, it can be seen in Tables 12.11 and 12.12 that the existing background concentrations already exceed the CLes or CLos, and in fact there are no new exceedances as a result of for these scenarios are already exceeded. Acid deposition is not an issue at any site.

12.7.34 Where the PEC is >100% of the CLo and CLe of the assessed pollutants the potential ecological implications are considered for each site below.

[vi] PEC is the PC combined with existing background pollutant concentrations.

Table 12.13: Summary of the PC as a % of the CLo and CLe of the Eastern and Western Developments in-isolation and in-combination with other developments.

12.7.35 Two values are provided for the SSSI to reflect the two sample location modelled. Where the PC exceeds 1% of the CLe or CLo the PEC is calculated. Potential effects are considered where the PEC exceeds 100% of the CLe or CLo.

Site	PC >1% of the relevant CLe or CLo?		Further Assessment Needed?	PEC >100% CLe/CLo in isolation?	PEC >100% CLe/ CLo in combination?
	In-isolation	In-combination			
Annual Mean NOx					
Ardley Cutting and Quarry SSSI (B430)	Yes: 1.6-2%	Yes: 14.9-19.0%	Yes	No: 82- 91.4%	Yes: 95.4–108.4%
Ardley Cutting and Quarry SSSI (M40)	Yes: 2.1-3.3%	Yes: 5.1–8.1%	Yes	Yes: 310.9-473%	Yes: 314 – 479.1%
Stoke Little Wood LWS	Yes: 2%	Yes: 5.2%	Yes	No: 58.2%	No: 61.5%
Twelve Acre Copse	Yes: 1.8%	Yes: 4.7%	Yes	No: 54.3%	No: 57.2%
Annual Mean NH_3					
Ardley Cutting and Quarry SSSI (B430)	Yes: 2.47-3.2%	Yes: 26.4-34.1%	Yes	Yes: 239.4-266.7%	Yes: 263.4-297.7%
Ardley Cutting and Quarry SSSI (M40)	Yes: 4.36-7.1%	Yes: 3.4-5.5%	Yes	Yes: 598.8-862.9%	Yes: 604.5-872.2%
Stoke Little Wood AW	Yes: 3%	Yes: 7.9%	Yes	Yes: 217.6%	Yes: 222.5%
Twelve Acre Copse AW	Yes: 3.1%	Yes: 8.1%	Yes	Yes: 227.7%	Yes: 237.5%
Nutrient Nitrogen Deposition					
Ardley Cutting and Quarry SSSI (B430)	Yes: 1.6-2.1%	Yes 17.1-21.9%	Yes	Yes: 211.2-221.3%	Yes: 226.6-241.1%
Ardley Cutting and Quarry SSSI (M40)	Yes: 2.6-4.4%	Yes 6.1- 9%	Yes	Yes: 427.7-590%	Yes: 431.2-595.5%
Stoke Little Wood LWS	Yes: 3.2%	Yes 8.6%	Yes	Yes: 333.7%	Yes: 343%
Twelve Acre Copse LWS	Yes: 3.2%	Yes 8.5%	Yes	Yes: 335%	Yes :340.2%
Acidifying Nitrogen Deposition					
Ardley Cutting and Quarry SSSI (B430)	No: <1%	No	No	No	No
Ardley Cutting and Quarry SSSI (M40)	No: <1%	No	No	No	No
Stoke Little Wood LWS	No: <1%	No	No	No	No

Site	PC >1% of the relevant CLe or CLo?		Further Assessment Needed?	PEC >100% CLe/CLo in isolation?	PEC >100% CLe/ CLo in combination?
	In-isolation	In-combination			
Twelve Acre Copse LWS	No: <1%	No	No	No	No

Ardley Cutting and Quarry SSSI

12.7.36 Table 12.13 indicates the PEC for the annual mean NOx is far in excess of the CLe for the sensitive lowland calcareous grassland, but only where the M40 intersects the SSSI (310.9-473%). The PEC is also far in excess of the CLe for NH_3 at both the B430 (239.4-266.7%) and M40 (598.8-862.9%), as well as the CLo for nitrogen deposition (211.2-221.3% and 427.7-590%, respectively).

12.7.37 However, the predicted contribution of the Development in isolation (the PC) is less than 5% of the CLo and CLe, and contributes only a very small proportion to the PEC. The background concentrations contribute the vast majority of the PEC and as already stated above, these are already far in excess of the CLo and CLe for lowland calcareous grassland (see also Tables 12.11 and 12.12 that illustrate this).

12.7.38 The total area of SSSI within 200m of the B430 and the M40 roads which is identified as lowland calcareous grassland priority habitat on Natural England's MAGIC[19] website is measured at approximately 3ha, with approximately 1.8ha located either side of the B430 and approximately 1.2ha located either side of the M40. Given the magnitude of the exceedance and the likely long-term duration of these exceedances, it would not be unreasonable to expect the grassland to already be showing symptoms of air pollution. For instance, reduced species diversity, in response to increased nutrient status of the soil.

12.7.39 Natural England has assessed the SSSI as being in 'unfavourable-recovering' condition, though the 'unfavourable' assessment is as a result of lack of scrub and grassland management. Natural England state that a management regime is now being implemented, where vegetation is now being cut back and removed from site reducing the nutrient load[52]. Issues resulting from air quality are not identified for the grassland habitat[Error! Bookmark not defined.] or as a known 'pressure'[53] to the SSSI, which might have been expected given the likely long-term elevated baseline levels. This does not mean that there is no effect as a result of the existing air quality baseline. Symptoms could be masked by the lack of historic management, indeed, with the ongoing management within the SSSI this may already mitigate some adverse effects from increased airborne nutrient deposition. The likely shifted baseline could make potential effects of further small increases in pollutant concentrations difficult to recognise in the field.

12.7.40 As noted in Appendix 9.8, JNCC guidance[54] states air quality impacts associated with the national network of trunk roads, which include the M40, should strictly speaking be excluded from the assessment. Consequently, while this impact assessment includes Ardley Cutting and Quarry SSSI alongside the M40, strictly speaking it falls under the responsibility of National Highways and can be excluded from the assessment. The B430 is not a trunk road and is therefore included in the assessment.

12.7.41 The air quality assessment used worst-case scenario data on a precautionary basis. In reality the contribution of the Development is therefore likely to be less than modelled in Appendix 9.8 for the following reasons:

- Most of the habitat alongside the railway embankments comprises trees and scrub, not calcareous grassland. These scrub and tree habitats are not designated SSSI features. These habitats are likely to provide some buffering to air quality impacts on the more sensitive calcareous grassland;
- Importantly, modelling does not account for potential reductions in background nitrogen deposition resulting from vehicle fleet decarbonisation (new diesel and petrol cars and vans would no longer be sold from 2030), though it is presumably difficult to model the rate of the reduction; and
- The elevation of the M40 above the SSSI is likely to result in some dilution and therefore reducing pollutant concentrations.

12.7.42 In light of the above, the Development is not likely to result in a perceptible change to the sensitive grassland for which the SSSI is notified. In any event, with the likely reduction in background nitrogen levels as a result of electrification of the vehicle fleet, the proportionately small increase in pollutants modelled relative to existing background is likely to gradually reduce. Impacts to the SSSI are therefore considered to be insignificant.

Stoke Little Wood LWS and Twelve Acre Copse LWS

12.7.43 For the Development in isolation, the PEC of ammonia concentrations far exceeds the CLe of 1 µg/m^3 at both LWSs. The PEC for nitrogen deposition is also far in excess of the CLo. The PEC for NOx is well below 100% of the CLe at both LWSs and so need not be considered further.

12.7.44 Similar to the situation described above for the SSSI, the background concentrations contribute the vast majority of the PEC and as also already stated above, these are already far in excess of the CLo and CLe for broadleaved deciduous woodland (see also Tables 12.11 and 12.12 that illustrate this).

12.7.45 Given the magnitude and long-term duration of the existing exceedance, it is reasonable to expect that the woodland nearest to the road is already experiencing symptoms of air pollution effects. Because baseline pollution levels have consistently exceeded the modelled CLos and CLes for some time, it is likely that more receptors have already been impacted. Therefore, the slight predicted increases in pollutant levels due to the development are not anticipated to cause a noticeable change to the woodland community within the road's influence zone.

12.7.46 Natural England further note in their guidance[55] that research has shown habitats already subjected to high background nitrogen deposition, as is likely the case at the two Ancient Woodlands given the high background concentrations, can develop a tolerance to the effects of further deposition. This insight is derived from Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations.

12.7.47 As stated above in respect of the Ardley Cutting and Quarry SSSI, the modelling did not account for potential reductions in pollutant emissions resulting from vehicle fleet decarbonisation, which in time is likely to reduce the modelled increases to existing baseline levels and potentially lower from 2035 with ban on ICE vehicles with the net zero governments target set for 2050.

12.7.48 In light of the above, the Development is not likely to result in a perceptible change to the woodland for which the LWSs are notified. In any event, with the likely reduction in background

nitrogen levels as a result of electrification of the vehicle fleet, the increase in pollutants modelled is likely to gradually reduce. Impacts to the LWSs are therefore considered to be likely to be insignificant.

Mitigation, Monitoring and Residual Effects

Eastern and Western Developments

Bats

12.7.49 To mitigate the potential adverse effects resulting from the illumination of retained and newly created habitat, a sensitive lighting scheme will be developed to ensure areas of value to bats, such as the retained hedgerows forming the boundaries of the Eastern and Western Sites and newly created habitats are not excessively lit. It is considered that this sensitive lighting scheme can be controlled via a suitably worded planning condition. Following implementation of a sensitive lighting scheme, it is considered that the completed Eastern and Western Developments would result in negligible effect on bats.

Hazel dormouse

12.7.50 To mitigate the potential adverse effects resulting from the illumination of the retained and newly created habitats, a sensitive lighting scheme will be developed to ensure the hedgerows are not excessively lit. It is considered that this sensitive lighting scheme can be controlled via a suitably worded planning condition. Following implementation of these measures, it is considered that the completed Eastern and Western Developments would result in negligible effect on hazel dormouse.

Development

12.7.51 Detailed lighting design would come forward in line with the principles defined in the Development Specification and external lighting strategy (submitted as a standalone document with the planning applications) through Reserved Matters application. Following the implementation of a sensitive lighting scheme, it is anticipated that the completed Development will result in negligible effect on all ecological receptors.

12.7.52 A summary of residual effects is provided in Table 12.13.

12.8 Cumulative Effects

12.8.1 The five cumulative schemes set out in Chapter 3: EIA Methodology have been considered as part of the assessment of potential cumulative effects. As with the Development, the cumulative schemes will be required to mitigate potential effects upon important ecological receptors and deliver a net gain in biodiversity in-line with the Local Plan. They are also required to adhere to the legislative framework and both national and local policy with regards to biodiversity. Information relating to anticipated effects and enhancements have been added, where known. A tiered approach is presented below, firstly considering the Development cumulatively with the neighbouring Tritax Scheme and subsequently considering the Development cumulatively with The Tritax Scheme and other relevant schemes.

The Development and Tritax Scheme

Construction

Assessment

12.8.2 With the exception of the minor adverse effects significant at the local level on farmland birds and ponds, the Development will not result in any significant residual adverse effects that could interact with those resulting from other developments.

Mitigation, Monitoring and Residual Effects

12.8.3 Approximately 20ha of grassland will be provided by the Applicant off-site at Piddington which is expected to provide habitat of greater suitability for farmland birds than the existing baseline habitats at the Site. Scrapes will be provided for lapwing and the grassland and hedgerow habitat provision will be provide suitable foraging and nesting habitat for other farmland birds such as skylark, yellowhammer and linnet. Given this habitat provision is approximately 12.8km from the Site, a minor adverse effect could occur at a local level. However, no residual effects were identified in relation to the construction phase of the Tritax Scheme which could act cumulatively with other schemes. Therefore, a negligible (insignificant) cumulative effect is anticipated when considering the Development with the Tritax Scheme.

12.8.4 In terms of overall beneficial effects, there is potential for the Development and Tritax Scheme to deliver a beneficial cumulative effect. The created habitat at Piddington will provide enhanced areas for farmland birds such as lapwing, skylark, yellowhammer and linnet to forage, roost and breed. Therefore, it is feasible that a beneficial cumulative effect will occur in cumulative with mitigation for other schemes in the district.

Completed Development

Assessment

12.8.5 No significant residual effects are anticipated at the completed Development stage, other than those in relation to air quality. Therefore, no significant cumulative effects are anticipated other than those in relation to air quality (see below).

12.8.6 The air quality assessment of sensitive ecological receptors included an cumulative assessment of the Development cumulatively with all other known schemes in the district (Including the Tritax Scheme). Therefore, cumulative effects in relation to air quality are discussed below under ‘The Development, Tritax Scheme and Other Schemes’.

12.8.7 No other significant residual effects are anticipated at the completed development stage of both the Development and the Tritax Scheme.

The Development, Tritax Scheme and Other Cumuative Schemes

Construction

Assessment

12.8.8 With the exception of the minor adverse effects on farmland birds and ponds significant at the local level, the Development will not result in any significant residual adverse effects that could interact with those resulting from other developments in the Bicester area. It is, reasonable to assume that there are sufficient planning and legislative controls to ensure that, in cumulative with the Development, potential significant effects on a cumulative basis would be mitigated.

12.8.9 Based on the information available for the other cumulative schemes, potentially significant effects on farmland birds have been identified for the Heyford Park scheme (ref: 18/00825/HYBRID), which is located approximately 2.8km south west of the Development. The Heyford Park ES acknowledges a permanent residual adverse significant effect at the Site level for breeding birds utilising grassland habitats, including skylark, during the construction phase in the absence of mitigation. Given a permanent residual minor adverse significant effect of the local level is also anticipated for the Development on breeding birds, it is therefore possible that a cumulative effect may occur, with displaced birds from the local area seeking suitable habitat elsewhere. As a result, a permanent minor adverse cumulative effect may occur of the local level.

12.8.10 No other residual effects were identified which may act cumulatively with the Development at the construction phase

Completed Development

Assessment

12.8.11 Table 12.13 includes a summary of the air quality assessment (Appendix 9.8) cumulatively with other developments. As expected, this found that the cumulative (in combination) modelled PECs for the developments resulted in greater exceedances at the designated sites than for the Development alone. As for the Development alone, there were no exceedances of any CLes or CLos that are not already being exceeded as a result of the existing background levels of pollutants. The exception is where the M40 crosses the SSSI though this is a slight exceedance and limited to within 5m of the road edge. As explained in paragraph 8.5 of Appendix 8.9, when considering the effects of an individual proposal on traffic related emissions, strategic trunk roads, which include the M40, should be excluded from the scope of the assessment.

12.8.12 The majority of pollutant increases will be concentrated near the road source. However, in the cumulative scenario, pollutant increases exceeding the 100% threshold are expected to extend further distances (up to 200 m) compared to when modelling the Development in isolation. It is anticipated that only relatively small areas of the SSSI where it is adjacent to the B430 would be exposed, and ongoing management within the SSSI is likely to already mitigate some existing adverse effects from pollution. Since the ancient woodland in the SSSI is approximately 280 m from the road, it is outside the 200 m zone, and air quality differences from the Development are unlikely to be discernible from background concentrations.

12.8.13 As stated above, while there would be a greater exceedance than when considered in isolation, given the background concentrations for these pollutants is far in excess of the CLo and CLe and impacts to sensitive flora would have already been expected to have occurred, it is unlikely there would be a perceptible change as a result of development. As also stated above, the modelling is precautionary and likely to be an over-estimate of the increases. Furthermore, with the electrification of the vehicle fleet is likely to gradually reduce total predicted pollutant levels and exposure overall to zero by 2050 as per government targets on net zero.

12.8.14 In light of the above, the cumulative effects of the Development with other developments on Ardley Cutting and Quarry SSSI, as well as the ancient woodland habitat within Stoke Little Wood LWS and Twelve Acre Copse LWS are likely to be imperceptible and hence are assessed as insignificant.

12.8.15 No other residual effects were identified which may act cumulatively with the Development at the completed and operational phase.

Mitigation, Monitoring and Residual Effects

12.8.16 Approximately 20ha of grassland will be provided off-site at Piddington which is expected to provide habitat of greater suitability for farmland birds than the existing baseline habitats at the Site. Scrapes will be provided for lapwing and the grassland and hedgerow habitat provision will be provide suitable foraging and nesting habitat for other farmland birds such as skylark, yellowhammer, and linnet. However, given this habitat provision is approximately 12.8km from the Site, it is anticipated that a cumulative effect with Heyford Park may occur given the loss of suitable farmland bird habitat within the local area. Therefore, a permanent residual minor adverse cumulative effect, significant at the local level is anticipated even with the implementation of the specified mitigation measures.

12.8.17 In terms of overall beneficial effects, it is possible that the sites could deliver a beneficial cumulative effect on farmland birds, providing all mitigation and enhancement measures committed to are delivered. The created habitat at Piddington will provide enhanced areas for farmland birds such as lapwing, skylark, yellowhammer and linnet to forage, roost and breed. Therefore, it is feasible that a beneficial cumulative effect will occur in cumulative with mitigation for other schemes in the district.

Table 12.13: Summary of Residual Effects

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Magnitude of Impact		Mitigation and Monitoring		Residual Effect	
Enabling Works and Construction									
Partial loss of trees	Low	Local	Permanent	Eastern Development	Loss of approximately 3 trees	Eastern Development	Multiple new trees planted on-site and off-site. Implementation of HMMP.	Eastern Development	Negligible
				Western Development	Loss of approximately 17 trees	Western Development		Western Development	Negligible
				Development	Loss of approximately 20 trees	Development		Development	Negligible
Partial loss of hedgerows	Low	Local	Permanent	Eastern Development	Loss of 0.77km of hedgerow	Eastern Development	0.85km of new hedgerow planting off-site. Implementation of HMMP.	Eastern Development	Negligible
				Western Development	Loss of 1.69km of hedgerow	Western Development	0.7km new hedgerow on-site and 0.7km of new hedgerow off-site. Implementation of HMMP.	Western Development	Negligible
				Development	Loss of 2.46km of hedgerow	Development	Creation of 0.7km of hedgerow on-site and 2.25km of hedgerow off-site. Implementation of HMMP.	Development	Negligible
Loss of Ponds	Low	Local	Permanent	Eastern Development	Loss of one pond (WB1)	Eastern Development	Provision of a pond within the off-site compensation area. Provision of swales within the Site which will hold water for part of the year.	Eastern Development	Minor adverse (local)
				Western Development	No pond removal, no impacts anticipated	Western Development	Not applicable	Western Development	Negligible
				Development	Loss of one pond (WB1)	Development	Provision of a pond within the off-site compensation area. Provision of swales within the Site which will hold water for part of the year.	Development	Minor adverse (local)
Disturbance to bats	High	District	Temporary	Eastern Development	Loss of potential foraging, commuting or roosting habitats	Eastern Development	Creation of new neutral grassland, swales, hedgerow and tree planting on-site and creation of neutral grassland and hedgerow planting off-site. Implementation of a sensitive lighting strategy during operation to minimise lighting to retained and created habitat features.	Eastern Development	Negligible
				Western Development		Western Development		Western Development	Negligible
				Development		Development		Development	Negligible
Disturbance to birds	Low	District	Permanent	Eastern Development	Loss of foraging and nesting habitat	Eastern Development	Creation of new neutral grassland, swales, hedgerow and tree planting on-site and creation of neutral	Eastern Development	Minor adverse (local)

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Magnitude of Impact		Mitigation and Monitoring		Residual Effect	
				Western Development		Western Development	grassland and hedgerow planting off-site.	Western Development	Minor adverse (local)
				Development		Development		Development	Minor adverse (local)
Disturbance to hazel dormouse	Low	Local	Permanent	Eastern Development	Loss and fragmentation of hedgerow habitat	Eastern Development	c.0.7km new hedgerow on-site and c.1.5km of new hedgerow planting off-site. Implementation of HMMP.	Eastern Development	Negligible
				Western Development		Western Development		Western Development	Negligible
				Development		Development		Development	Negligible
Completed Development									
Changes to the ecological features of Ardley Cutting and Quarry SSSI	High	National	Permanent	Eastern Development	Potential alterations to habitat composition associated with higher levels of nutrient nitrogen, ammonia, acid and NOx emissions	Eastern Development	None required	Eastern Development	Insignificant
				Western Development	Potential alterations to habitat composition associated with higher levels of nutrient nitrogen, ammonia, acid and NOx emissions	Western Development		Western Development	Insignificant
				Development	Potential alterations to habitat composition associated with higher levels of nutrient nitrogen, ammonia, acid and NOx emissions	Development		Development	Insignificant
Ancient woodland at Stoke Wood LWS and Little Stoke Wood LWS	Medium	County	Permanent	Eastern Development	Potential alterations to habitat composition associated with higher levels of nutrient nitrogen, ammonia and NOx emissions	Eastern Development	None required	Eastern Development	Insignificant
				Western Development	Potential alterations to habitat composition associated with higher levels of nutrient nitrogen, ammonia and NOx emissions	Western Development		Western Development	Insignificant
				Development	Potential alterations to habitat composition associated with higher levels of nutrient nitrogen, ammonia and NOx emissions	Development		Development	Insignificant
Disturbance to bats	High	District	Permanent	Eastern Development	Lighting disturbance to hedgerows and newly created habitats that may be used by bats	Eastern Development	Implementation of a sensitive lighting strategy	Eastern Development	Negligible
				Western Development		Western Development		Western Development	Negligible
				Development		Development		Development	Negligible

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Magnitude of Impact		Mitigation and Monitoring		Residual Effect	
Disturbance to hazel dormouse	Low	Local	Permanent	Eastern Development	Lighting disturbance to hedgerows that may be used by hazel dormouse	Eastern Development		Eastern Development	Negligible
				Western Development		Western Development		Western Development	Negligible
				Development		Development		Development	Negligible
Retained and created habitats	Low	Local	Permanent	Development	Poor management of habitats	Development	Implementation of HMMP	Development	Negligible

References

[1] Wildlife and Countryside Act, 1981. [Online] Available at: https://www.legislation.gov.uk/ukpga/1981/69 [Accessed: 29/01/2024]

[2] The Environment Act, 2021. [Online] Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted [Accessed: 29/01/2024]

[3] The Conservation of Habitats and Species Regulations, 2017. [Online] Available at: http://www.legislation.gov.uk/uksi/2010/490/contents/made [Accessed: 29/01/2024]

[4] Countryside and Rights of Way Act, 2000. [Online] Available at: https://www.legislation.gov.uk/ukpga/2000/37/contents [Accessed: 29/01/2024]

[5] Protection of Badgers Act, 1992. [Online] Available at: http://www.legislation.gov.uk/ukpga/1992/51/contents [Accessed: 29/01/2024]

[6] The Hedgerow Regulations, 1997. [Online] Available at: http://www.legislation.gov.uk/uksi/1997/1160/contents/made [Accessed: 29/01/2024]

[7] The Natural Environment and Rural Communities (NERC) Act 2006. [Online] Available at: https://www.legislation.gov.uk/ukpga/2006/16/contents [Accessed: 29/01/2024]

[8] Wild Mammals (Protection) Act 1996. [Online] Available at: https://www.legislation.gov.uk/ukpga/1996/3/contents [Accessed: 29/01/2024]

[9] Ministry of Housing, Community and Local Government, (2023). [Online] Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed: 23/01/2024]

[10] Cherwell District Council, Adopted September 2020. Cherwell Local Plan 2011 - 2031 Part 1 Partial Review. [Online] Available at: https://www.cherwell.gov.uk/info/83/local-plans/215/adopted-cherwell-local-plan-2011-2031-part-1-partial-review---oxfords-unmet-housing-need [Accessed 29/01/2024]

[11] Cherwell District Council, Re-adopted December 2016. Cherwell Local Plan 2011 - 2031 Part 1. [Online] Available at: https://www.cherwell.gov.uk/info/83/local-plans/376/adopted-cherwell-local-plan-2011-2031-part-1 [Accessed: 29/01/2024]

[12] Cherwell District Council, 2023. Cherwell Local Plan Review 2024 Consultation Draft (Regulation 18) September 2023. [Online] Available at: https://www.cherwell.gov.uk/local-plan-review-2040 [Accessed: 23/01/2024]

[13] Oxford City Council. Biodiversity Action Plan 2015 -2020, [Online] Available at: https://www.oxford.gov.uk/downloads/file/2109/biodiversity_action_plan_2015-20 [Accessed: 29/01/2024]

[14] Cherwell Biodiversity Action Plan 2016-18. [Online] Available at: https://www.cherwell.gov.uk/downloads/file/320/cherwell-biodiversity-action-plan-2016-2018 [Accessed: 29/01/2024]

[15] BSI, 2013. BS 42020:2013 Biodiversity - code of practice for planning and development

[16] BSI Standards Publication (2012). Trees in relation to design, demolition and construction – Recommendations.

[17] CIEEM (2018) Guidelines for Ecological Impact Assessment in the United Kingdom, Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1 2019. Chartered Institute of Ecology and Environmental Management.

[18] CIEEM (2023) Advice on Ecological Assessment of Air Quality Impacts, Version 2. Chartered Institute of Ecology and Environmental Management. Winchester, UK

[19]Defra (2024) MAGIC map software. [Online] Available at : https://magic.defra.gov.uk/MagicMap.aspx [Accessed: 29/01/2024]

[20] JNCC (2016). Handbook for Phase 1 habitat survey- a technique for environmental audit.

[21] UKHab Ltd (2023) UK Habitat Classification Version 2.0, [Online] Available at: https://www.ukhab.org, [Accessed: 24/01/2024].

[22] JNCC (2011) List of UK BAP Priority Habitats. [Online] Available at: https://jncc.gov.uk/our-work/uk-bap-priority-habitats/#list-of-uk-bap-priority-habitats [Accessed: 29/01/2024]

[23] Harris S, Cresswell P and Jefferies D (1991) (Report) Surveying Badgers. The Mammal. Society, Bristol.

[24] Roper, T.J. (2010). Badger. Harper Collins

[25] Natural England (2014) Protected species and development: advice for local planning authorities. [Online] Available at: https://www.gov.uk/guidance/protected-species-how-to-review-planning-applications [Accessed: 29/01/2024]

[27] BCT (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). February, 2016

[29] Bibby C.J, Burgess N.D, Hill D.A, Mustoe S.H. (2000) Bird Census Techniques. Second Edition

[30] English Nature (2001) Great Crested Newt Mitigation Guidelines. English Nature, Peterborough

[31] Tom Langton, Catherine Beckett and Jim Foster (2001) Great Crested Newt Conservation Handbook, Froglife, Suffolk.

[32] 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. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA*.Freshwater Habitats Trust, Oxford

[33] Bright, P., Morris, P. and Mitchell-Jones, T (2011) The Dormouse Conservation Handbook, Second edition, English Nature.

[34] Natural England (2011) Interim Natural England Advice Note - Dormouse Surveys for mitigation licensing - best practice and common misconceptions, Natural England.

[35] CIEEM (2019) Advice Note on the Lifespan of Ecological Reports and Surveys. [Online] Available at: https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf [Accessed: 25/01/2024]

[36] TVERC (2018) LOCAL WILDLIFE SITES SELECTION CRITERIA: Berkshire, Buckinghamshire and Oxfordshire, Version 7. [Online] Available at: https://www.tverc.org/cms/sites/tverc/files/LWS%20Selection%20Criteria_v7%20Aug18.pdf [Accessed: 29/01/2024]

[37] National Bat Monitoring Programme Annual Report 2022. [Online] Available at: https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/NBMP-annual-report-2022.pdf?v=1698226228&_gl=1*mou48b*_ga*NzU0ODY4OTQ0LjE3MDY1MzEyOTE.*_ga_G28378TB9V*MTcwNjUzMTI5MC4xLjAuMTcwNjUzMTI5MC4wLjAuMA. [Accessed: 29/01/2024]

[38] 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.

[39] BTO (2023) Breeding Evidence, [Online] Available at: https://www.bto.org/our-science/projects/birdatlas/methods/breeding-evidence [Accessed: 31/01/2024]

[40] Natural England (2022) Guidance: Great crested newts: advice for making planning decisions, [Online] Available at: https://www.gov.uk/guidance/great-crested-newts-advice-for-making-planning-decisions [Accessed: 31/01/2023]

[41] Bright, P., Morris, P., Mitchell-Jones, T. (2006) Dormouse Conservation Handbook. English Nature (now Natural England), Peterborough.

[42] NBN atlas (2023) NBN Atlas for species. [Online] Available at: https://species.nbnatlas.org/species/

[43] Ministry of Housing, Community and Local Government, (2023). The National Planning Policy Framework, 2023. [Online] Available at: https://www.gov.uk/guidance/national-planning-policy-framework [Accessed: 23/01/2024]

[44] Defra (2023) Statutory biodiversity metric calculation tool, [Online] Available at: https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides [Accessed: 25/01/2024]

[45] Defra (2023) The Statutory Biodiversity Metric User Guide (draft) Date: November 2023, [Online] Available at: https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides [Accessed: 25/01/2024]

[46] Defra (2023) Statutory biodiversity metric condition assessments, [Online] Available at: https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides [Accessed: 25/01/2024]

[47] Air Quality and Pollution Service [Online] Available at: https://www.apis.ac.uk/ [Accessed: 17/04/2024]

[48]CHAPMAN, C. & KITE, B. 2021. Guidance on Decision-Making Thresholds for Air Pollution. JNCC Report No.696 (Main Report), JNCC, Peterborough, ISSN 0963-8091.

[49] Woodland Trust (2019) Assessing air pollution impacts on ancient woodland – ammonia [Online] available at: https://www.woodlandtrust.org.uk/media/1687/ammonia-impacts-on-ancient-woodland.pdf [Accessed: 17/04/2024]

[51] Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (NEA001), Natural England, Peterborough.

[52] Natural England (date unknown) Ardley Cutting and Quarry SSSI Unit Detail, Ardley Cutting and Quarry SSSI - CUTTING (002), [Online] Available at: https://designatedsites.naturalengland.org.uk/UnitDetail.aspx?UnitId=1022421 [Accessed: 29/02/2024]

[53] Natural England (date unknown) Natural England (year unknown) Ardley Cutting and Quarry SSSI – Pressures, [Online] Available at: https://designatedsites.naturalengland.org.uk/SitePressures.aspx?SiteGuid=30af95e3-5a50-e411-a6ba-000d3a2004ef&SiteCode=S1000903&SiteName=Ardley%20Cutting%20and%20Quarry%20SSSI [Accessed: 29/02/2024]

[54] Chapman, C & Kite, B (2021) *Guidance on Decision-making thresholds for air pollution. JNCC Report No. 696 (Main Report)*, JNCC, Peterborough, ISSN 09063-8091.

[55] Natural England. 2018. Approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (NEA001)