



Preliminary Environmental Information (Work in Progress) Report (PEIR)

Draft Environmental Statement

Chapter 6: Ecology including Arboriculture

On behalf of
Oxfordshire Railfreight Limited

Prepared by FPCR
May 2022

CONTENTS

- 6.1 INTRODUCTION
- 6.2 ASSESSMENT SCOPE AND METHODOLOGY
- 6.3 POLICY CONTEXT
- 6.4 BASELINE CONDITIONS
- 6.5 ASSESSMENT OF LIKELY EFFECTS
- 6.6 MITIGATION AND RESIDUAL EFFECTS
- 6.7 CUMULATIVE EFFECTS
- 6.8 SUMMARY AND CONCLUSIONS

APPENDICES

APPENDIX 6.1: ECOLOGICAL APPRAISAL REPORT (redacted for public consultation)

APPENDIX 6.2: ARDLEY CUTTING & QUARRY SSSI BOTANICAL SURVEY

APPENDIX 6.3: BAT REPORT

APPENDIX 6.4: GCN REPORT

APPENDIX 6.5: BREEDING BIRD REPORT

APPENDIX 6.6: WINTER BIRD REPORT

APPENDIX 6.7: ARBORICULTURAL ASSESSMENT

6.1. INTRODUCTION

- 6.1.1 This draft ES chapter has been prepared by FPCR Environment and Design Ltd. to provide preliminary environmental information for the purposes of consultation. It is not a complete chapter but is work in progress. It does provide the relevant environmental information gathered up to this point.
- 6.1.2 It reviews the existing baseline ecology of the site and the impacts and effects resulting from the development as currently proposed.. The final assessment to be submitted with the application for a development consent order will also consider and evaluate the potential direct, indirect and cumulative impacts during the construction and operational phases of the scheme and outline working methods and appropriate mitigation and compensation measures. Biodiversity enhancements will be proposed and described, and residual effects following mitigation and compensation identified. A separate Ecological Appraisal Report is provided within **Appendix 6.1**, and reference to this is made throughout the chapter¹.
- 6.1.3 A detailed description of the site and Proposed Development is provided in Chapters 2 and 3 respectively, but the proposals can be summarised as:
- An intermodal freight terminal and associated infrastructure including container storage and HGV parking, and rail sidings to serve individual warehouses;
 - Up to 603,850 sq m (gross internal area) of warehousing and ancillary buildings, with additional floorspace provided in the form of mezzanines;
 - New road infrastructure and works to the existing road network, including the provision of a new Ardley Bypass, delivered as part of wider improvements to M40 Junction 10 which will bridge over the Chiltern Main railway line, Middleton Stoney Relief Road to comprise a single carriageway road that will provide a link from the B4030, Heyford Park Link Road which will provide a link from the B430 north of Middleton Stoney to Heyford Park and related traffic management measure;
 - Relocation of the Severn Trent Green Power IVC Composting facility;
 - Strategic landscaping and tree planting, including diverted public rights of way and new foot and cycle links and associated drainage;
 - Earthworks and demolition of existing structures on the SRFI site.
- 6.1.4 All the land involved in delivering the Oxfordshire Strategic Rail Freight Interchange proposals as a whole – comprising the Main Site and Highway Works areas, including the proposed Ardley Bypass and Middleton Stoney Relief Road – is referred to as the Application Site. A summary term for the proposals as a whole is the ‘Proposed

¹ As some of the survey information is sensitive, a redacted version has been prepared to support the Consultation process.

Development'. Full description of the Proposed Development and a Glossary of terms are provided within Chapter 2 Description of Development and Alternatives.

Competency Statement

- 6.1.5 The ecological surveys, assessment and preparation of this chapter have been carried out by suitably experienced ecologists and Members of the CIEEM in accordance with the guidance of the professional institution².
- 6.1.6 The arboricultural surveys have been carried out by a suitably experienced arboriculturist with LANTRA Professional Tree Inspector status and member of the Arboricultural Association.
- 6.1.7 FPCR are a multi-disciplinary environmental and design consultancy with over 60 years' experience of architecture, landscape, ecology, urban design, masterplanning and environmental impact assessment. The practice is a member of the Institute of Environmental Management and Assessment (IEMA) and is frequently called upon to provide expert evidence at Public and Local Plan Inquiries. FPCR have extensive experience and expertise of the EIA process.

² Chartered Institute of Ecology and Environmental Management (CIEEM) 2016. *Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater and Coastal.*

6.2. ASSESSMENT SCOPE AND METHODOLOGY

Desktop Study

- 6.2.1. A desktop survey was undertaken in July 2018 and updated in 2020/21 in order to obtain background information and existing biological data and nature conservation records, including locations and citations for sites designated for their nature conservation interest, both statutory and non-statutory, according to the following parameters:
- 15km around the site for sites of International Importance (e.g. Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites);
 - 2km around the site for statutory sites of National Importance (e.g. Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR)); and
 - 1km around the site for non-statutorily designated sites of County Importance (e.g. Sites of Importance for Nature Conservation (SINC) / Local Wildlife Sites (LWS) and protected or otherwise notable species records (including species of Principal Importance under S41 of the Natural Environment and Rural Communities (NERC) Act (2006) from within the preceding 20 years.
- 6.2.2. The following organisations / databases were contacted or used to inform the desk study and identify any features of potential importance for nature conservation in the wider countryside:
- Multi Agency Geographic Information for the Countryside (MAGIC) website³;
 - Thames Valley Environmental Records Centre (TVERC);
 - Colour 1:25,000 OS base maps; and
 - Aerial photographs from Google Earth.

Field Survey

- 6.2.3. The following paragraphs outline the surveys carried out to date, some further survey work is ongoing.

Flora

- 6.2.4. The ecological site survey of the Main Site was completed on 21st February 2018 and updated on 22nd June 2020 and 17th / 18th May 2021 overseen by an experienced botanist with a Field Identification Certificate (FISC) level 4. Additional areas associated with the Highways Works areas were undertaken on 28th / 29th June 2021 and 11th / 12th August 2021. Survey comprised an Extended Phase 1 Habitat Survey which involved classification of the broad habitat types present using

³ <https://magic.defra.gov.uk/MagicMap.aspx>

the system published by the UK Joint Nature Conservation Committee⁴, and the identification of any Habitats of Principal Importance for the conservation of biodiversity as listed within Section 41 (S.41) of the NERC Act 2006. Where considered appropriate, additional habitat condition information was collected. .

- 6.2.5. Hedgerows were surveyed using the Hedgerow Evaluation and Grading System (HEGS)⁵ and also assessed against the Wildlife and Landscape criteria contained within Statutory Instrument No: 1160 – the Hedgerow Regulation 1997 to determine whether they qualified as ‘important’ under the Regulations.
- 6.2.6. Detailed survey of the SSSI and associated habitats, was also undertaken by an experienced ecologist (FISC level 6) in August 2020. Detailed methodologies for completing the botanical surveys are provided in **Appendix 6.2**.

Fauna

- 6.2.7. Further detailed specific-species surveys have been completed over the site during appropriate survey periods in 2018 to 2022 including:
 - Badger *Meles meles* surveys;
 - Bat surveys of the buildings and trees including aerial inspection of mature trees identified as potential roost sites;
 - Appropriate nocturnal surveys of mature trees and buildings (where necessary);
 - Seasonal bat activity transect & static detector surveys;
 - Aquatic great crested newt (GCN) *Triturus cristatus* surveys and eDNA testing;
 - Winter bird surveys;
 - Breeding bird surveys;
 - Reptile surveys;
 - Otter *Lutra lutra* survey; and
 - Water vole *Arvicola amphibius* survey.
- 6.2.8. Full methodologies for the completion of the above-mentioned surveys are detailed in **Appendices 6.1 - 6.6**.

⁴ JNCC, 2010. *Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit*. Joint Nature Conservation Committee, Peterborough.

⁵ Clements, D.K., & Tofts, R.J. 1992. *Hedgerow Evaluation and Grading System (HEGS): A methodology for the ecological survey, evaluation and grading of hedgerows*. Countryside Planning and Management.

Trees

- 6.2.9. The arboricultural assessment was completed on 28th June 2021 by an experienced arboriculturist with LANTRA Professional Tree Inspector status. The assessment was undertaken in accordance with guidance contained within British Standard 5837:2012 'Trees in Relation to Design, Demolition and Construction - Recommendations'. The guidelines set out a structured assessment methodology to determine existing trees' arboricultural value, based on their current condition and quality.

Evaluation and Assessment

- 6.2.10. The evaluation and assessment of nature conservation features of interest and potential impacts on them will be based on guidelines defined within the CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland⁶. In determining the importance of ecological features, various factors will be considered including but not limited to: statutory and non-statutory designation status, legal protection, habitat connectivity and/or synergistic associations, size of habitat or population, habitat condition and local rarity. The importance of ecological features has been defined in a geographical context. Impacts and effects will be assessed in terms of their magnitude, extent, duration, reversibility, timing and frequency, confidence in predictions and whether they are positive or negative.
- 6.2.11. Sensitivity of the ecological receptor and magnitude of effect will be considered to determine the level of significance of the effect, whether it be beneficial or adverse to the integrity of the ecological receptor. The level of significance will then be described as follows:
- Major: an effect considered very important in the decision process;
 - Major-Moderate: an effect that is considered material in the decision process;
 - Moderate: an effect that is notable, but not material in the decision process;
 - Minor: an effect that will be noticed, but is not relevant to the decision process (not significant); and
 - Negligible: an effect that will be discernible but of very limited consequences that is not relevant to the decision process (not significant).
- 6.2.12. Mitigation or compensation will be identified for significant impacts on features of nature conservation importance. In line with current CIEEM guidelines the mitigation for the Proposed Development should aim to:

⁶ *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

- Avoid significant adverse ecological impacts;
 - Reduce adverse impacts that cannot be avoided; and
 - Compensate for any residual significant ecological impacts.
- 6.2.13. Priority will be given to avoidance of adverse effects, where possible, through primary or 'embedded' mitigation measures i.e. masterplanning and project design and/or regulation of the project through aspects such as timing, storage of materials etc. Where this is not possible, opportunities are sought to reduce adverse effects as much as is feasible. If significant effects cannot be avoided through mitigation, then compensation that is considered appropriate to offset the adverse effects of the project will be outlined.

Consultation

Scoping Opinion

- 6.2.14. Comments relevant to the ecology and nature conservation of the site were received from the Planning Inspectorate as part of the Scoping Opinion process for the Proposed Development⁷.
- 6.2.15. Queries or concerns relating to the ecology of the site raised as part of the above process are addressed within this Chapter. A summary of the original comments and the corresponding responses is provided in Table 6.1.

Table 6.1 Summary of Consultee Responses

Planning Inspectorate Comment Summary	Response
Reptiles The ES should be supported by a sufficient level of survey effort for reptiles.	Reptile surveys were undertaken across suitable habitats throughout the Main Site and Highway Works areas during the 2021 field season. The results of these surveys are considered within the relevant sections of this chapter, and full survey data is reported within the supporting Ecological Appraisal Report (Appendix 6.1).
Aquatic Ecology The ES should include an assessment of effects on aquatic ecological receptors where significant effects are likely to occur.	Potential effects on the flora and fauna communities associated with the watercourses are considered within the relevant sections of this chapter, and full survey data is reported within the supporting Ecological Appraisal Report (Appendix 6.1).
Study Area The ES should justify any study areas used for the assessment and ensure that they are appropriate	The geographical extent of the search areas for biodiversity information was related to the significance of ecologically valuable receptors

⁷ Scoping Opinion: Proposed Oxfordshire Strategic Rail Freight Interchange. Case Reference: TR050008, July 2021

Planning Inspectorate Comment Summary	Response
<p>for identifying the likely significant effects of the Proposed Development, with support of appropriate figures. Study areas should be established in conjunction with other relevant aspect assessments, such as air quality. The ES should also make use of Natural England Site of Special Scientific Interest (SSSI) impact risk zones and consider impact pathways to determine the likely indirect effects on designated sites, rather than focus on a defined study area to determine likely significant effects.</p>	<p>and their sensitivity to environmental change, the nature of the proposals, potential impact pathways such as air and water pollution, and potential Zones of Influence⁸ which might arise during the construction and operation phases. Natural England's SSSI Impact Risk Zone (IRZ) Tool was used (via the MAGIC website⁹) to determine whether the type and scale of the Proposed Development was considered by Natural England to have the potential to affect statutory designated sites of International and National Importance¹⁰.</p>
<p>Field Surveys The ES should set out the methods and guidance employed for field surveys, in addition to CIEEM guidance¹¹, the results of these baseline surveys and discuss the methodologies with the relevant conservation bodies. Any limitations or difficulties encountered during the survey should be fully described. The temporal and spatial extent of field surveys should also be described and be sufficient to provide a baseline for the assessment of all the land affected within the redline boundary.</p>	<p>The field survey methodologies and results for each target species and faunal group and any limitations or difficulties encountered during surveys are summarised within Section 4 of this chapter and are discussed in further detail within the relevant Appendices (Appendix 6.1-6.6). Natural England has been consulted with regard to survey effort, results, mitigation, and enhancement, including licencing requirements as appropriate.</p>
<p>Ancient Woodland and Veteran Trees Given the location of the Proposed Development and potential for effects on Ancient Woodland, the Applicant should scope in potential effects on this habitat. The ES should confirm whether any mature trees are considered to be veteran trees, and address these as specific receptors where significant effects are likely to occur.</p>	<p>Potential effects of air pollution and dust acting on off-site ancient woodland habitats will be considered within the Air Quality Chapter 4. A single veteran tree was identified within the Main Site boundary (an ash, tree T170 within the Arboricultural Report, Appendix 6.7). This tree will be retained and afforded an enhanced root buffer equating to at least 15x the stem diameter, or 5m beyond the canopy, whichever is the greater, in accordance with industry guidance¹². The CEMP will specify precautionary working methods to be adhered to in order to avoid direct and indirect harm to the tree during construction, including details of barriers or signage to be deployed as</p>

⁸ Zone(s) of influence are the areas over which ecological features may be affected by the biophysical changes caused by the proposed project and associated activities (CIEEM, 2019).

⁹ <https://magic.defra.gov.uk/MagicMap.aspx>

¹⁰ Natural England. 2019. *Impact Risk Zones for Sites of Special Scientific Interest – User Guidance*.

¹¹ CIEEM 2019: *Guidelines for Ecological Impact Assessment in the UK and Ireland*, Chartered Institute of Ecology and Environmental Management, Version 1.1.

¹² Lonsdale, D. (Ed.). 2013. *Ancient and other veteran trees: further guidance on management*. London: The Tree Council.

Read, H. 2000. *Veteran Trees: A guide to good management*. English Nature, Peterborough.

Planning Inspectorate Comment Summary	Response
	appropriate. As such no potential significant effects to tree T170 are considered likely.
Effects on designated sites In line with the key principles from CIEEM guidance ⁵ , the ES should detail the steps taken to avoid impacts on protected sites before mitigation and compensation are considered.	This chapter will address the steps taken to avoid impacts on protected sites.
Desktop study and baseline The ES should describe the sources and dates of data used to inform the baseline desktop study.	These are provided in Section 6.4 and Appendix 6.1 .
Future Baseline The ES should consider the objectives of the relevant Oxfordshire Conservation Target Area (CTAs) ¹³ regarding land use, management and biodiversity enhancements to inform the future baseline evaluation. The future baseline should also consider future changes within areas currently being quarried or that are proposed for mineral extraction.	The future baseline will be discussed within Section 6.4 and encompass consideration of CTAs and of areas currently undergoing mineral extraction and those areas proposed for future extraction works.
Loss of habitat, fragmentation and indirect effects In addition to direct loss, the ES should also consider the indirect effects on habitats due to fragmentation.	Indirect effects on habitats due to fragmentation are considered within Section 6.5.
Disturbance to protected species The ES should address the potential for disturbance effects on legally protected species due to noise, emissions, pollution, loss or fragmentation of habitats, lighting and effects on foraging or commuting behaviour.	Indirect effects on legally protected species due to noise, emissions, pollution, loss or fragmentation of habitats, lighting and effects on foraging or commuting behaviour are considered within Section 6.5.
Habitats of principal importance The ES should specifically reference and take into account the UK List of Priority Habitats and Species present within the redline boundary, such as broadleaved woodland, hedgerows, ponds, lowland grassland and arable field margins. It should be made clear which broadleaved woodland habitat the effects relate to, with reference to the published list of Habitats of Principal Importance (HPIs).	All relevant HPIs are considered within this chapter, with full survey data reported within the supporting Ecological Appraisal Report (Appendix 6.1).
Direct and indirect effects on statutory designated sites The ES should set out what effects on statutory designated sites have been assessed, including	The potential effects on statutory designated sites included within this assessment are detailed within Section 6.5. These include effects during development construction and

¹³ Wild Oxfordshire 2020. <https://www.wildoxfordshire.org.uk/biodiversity/conservation-target-areas/>

Planning Inspectorate Comment Summary	Response
both direct and indirect, secondary, cumulative, and temporary and permanent effects from both construction and operation of the Proposed Development. The ES should also consider the potential for indirect effects on other statutory designated sites outside of the redline boundary where a receptor pathway exists. The consideration of effects on statutory designated sites should also be carried out in conjunction with other relevant aspect assessments such as noise or air quality.	operation and incorporate indirect effects such as potential effects on noise and air quality.
Effects on areas outside of the Main Site The ES should detail the likely receptors for works affecting elements of the development within the entire redline boundary, and those potentially indirectly affected but outside the redline boundary such as effects of changes in air quality on designated sites.	This Chapter considers ecological receptors throughout the Application Site and those that are located outside the Application Site but potentially would be indirectly affected, including off-site designated sites within the relevant Zone of Influence.

- 6.2.16. Natural England have been engaged to provide guidance via their pre-application Discretionary Advice Service (DAS) on the proposals with regard to their impact on i) Ardley Cutting and Quarry SSSI , and ii) protected species within and adjacent to the site. These discussions are ongoing.

Limitations and Assumptions

- 6.2.17. Ecological surveys have been carried out in accordance with the appropriate guidance. However, species lists should not be regarded as exhaustive and the absence of evidence of species does not necessarily mean that it is not present within the site. Surveys have been carried out to an appropriate level to provide sufficient information with which to enable classification and an assessment of major habitat types within the site, and the likely presence or absence of legally protected and otherwise notable habitats and species.
- 6.2.18. The red line boundary was extended on several occasions over the course of the survey period following the initial surveys undertaken in 2018. The extent of surveys on each occasion reflected the boundary of the draft proposals at the time as accurately as possible, however there were some limitations to access to land controlled by third parties and to land closely adjacent to existing highways. These areas were relatively small therefore surveys were able to cover almost the entire extent of the site. As such the minor restrictions to access are not considered to represent a constraint to the overall robustness of the field data recorded.

- 6.2.19. Arboricultural surveys have been carried out from ground level only to an appropriate level to determine existing trees' arboricultural value, based on their current condition and quality and enable classification. Aerial tree inspections or an assessment of the internal condition of the stem/s or branches were not undertaken at this stage.
- 6.2.20. Detailed inspection of the farm buildings was limited in places due to safety restrictions and the absence of access hatches into some roof voids. These limitations have been considered within the assessment of individual buildings with regard to bat roost potential, and the resulting proposed mitigation has accounted for this constraint.
- 6.2.21. Buildings B10 and B11 were not accessible for survey until spring 2022, therefore have only been subject to internal and external inspection and not to nocturnal bat surveys. These are to be retained within the scheme with minor renovation works proposed. They are discussed within **Appendix 6.3** together with alternate scenarios to ensure the favourable conservation status of local bat species will not be adversely impacted by works.
- 6.2.22. Sections of grassland verge flanking the M40 and small sections flanking junction 10 were not accessible to direct survey. Descriptions were made from viewing from a distance using binoculars, inference from data collected through survey of neighbouring verges of the A508, and available desk study data. From this sufficient information was available to provide an adequate assessment of these habitats and to provide recommendations for mitigation.
- 6.2.23. Hedgerow H57 was not accessible to direct survey due to its location to the east of the busy Baynards Green roundabout. Furthermore, it is relevant that this native hedgerow is associated with the verge of junction 10 of the M40 and likely to be of recent origin. Therefore, it is considered that sufficient information is available to evaluate the ecological importance of H57 and to provide recommendations for mitigation.
- 6.2.24. Small stretches of the Ashgrove Brook (a tributary of Gagle Brook), and the Padbury Brook Tributary were inaccessible due to dense bankside vegetation. It was considered that a sufficient proportion of these watercourses were surveyed to determine the likely presence/ absence of water vole and otter.
- 6.2.25. Some small areas of habitat within the northern part of the Highway Works in the vicinity of Junction 10 of the M40 were potentially suitable to support reptile species however could not be safely accessed for reptile survey. Similarly grassland and scrub cover alongside the embankments of the active railway track were not accessible for survey due to health and safety restrictions. Surveys did encompass similar neighbouring/contiguous habitats where possible however, and the following assessment takes limitations to survey access into account to address the potential underestimation of local reptile populations.

6.2.26. Given the timing of the evolution of the project with regards to the location and extent of the Highway Works area it was not possible to access and assess ponds neighbouring this part of the site during the 2021 survey season. Desk study data has therefore been relied upon as the only source of information to date, with surveys of ponds within the Highways Works areas scheduled for completion in spring 2022. Similarly final bat activity and breeding bird surveys within the Highways Works areas are scheduled for completion in spring 2022.

6.3. POLICY CONTEXT

National Context

National Policy Statement for National Networks (NPS December 2014)

- 6.3.1. The NPS sets out the national vision and policy for the future development of nationally significant infrastructure projects on the national road and rail networks. Core to this is that the Government recognises that for development of the national road and rail networks to be sustainable these should be designed to minimise social and environmental impacts and improve quality of life.
- 6.3.2. Section 5: Biodiversity and Ecological Conservation (paragraphs 5.20-5.38) of the NPS sets out how impacts should be considered. Biodiversity and ecological conservation is dealt with within paragraphs 5.20 - 5.38.
- 6.3.3. Paragraphs 5.22-5.25 states that:
"Where the project is subject to EIA the applicant should ensure that the environmental statement clearly sets out any likely significant effects on internationally, nationally or locally designated site of ecological or geological conservation importance (including those outside England) on protected species and on habitats and other species identified as being of principle importance for the conservation of biodiversity and that the statement considers the full range of potential impacts on ecosystems".
- "The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests."*
- "...development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives. The applicant may also wish to make use of biodiversity offsetting."*
- 6.3.4. Paragraph 5.29 states that:
"Where a proposed development on land within or outside a SSSI is likely to have an adverse effect on a SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect on the site's notified special interest features is likely, an exception should be made only where the benefits of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSIs. The Secretary of State should ensure that the applicant's proposals to mitigate the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or geological interest, are acceptable. Where necessary, requirements and/or planning obligations should be used to ensure these proposals are delivered."
- 6.3.5. Paragraph 5.32 states that:

"Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated. The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the national need for and benefits of the development, in that location, clearly outweigh the loss. Aged or veteran trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided. Where such trees would be affected by development proposals, the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons for this."

6.3.6. The NPS also states that:

"Sites of regional and local biodiversity and geological interest (which include Local Geological Sites, Local Nature Reserves and Local Wildlife Sites and Nature Improvement Areas) have a fundamental role to play in meeting overall national biodiversity targets.... The Secretary of State should give due consideration to such regional or local designations. However, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent." (Paragraph 5.31)

"Development proposals potentially provide many opportunities for building in beneficial biodiversity or geological features as part of good design...the Secretary of State should consider whether the applicant has maximised such opportunities in and around developments." (Paragraph 5.33)

"Applicants should include appropriate mitigation measures as an integral part of their proposed development, including identifying where and how these will be secured." (Paragraph 5.36)

National Planning Policy Framework (NPPF July 2021)

- 6.3.7. The NPPF sets out the planning policies for England and how these are to be applied. It is a material consideration in planning decisions but does not contain specific policies for nationally significant infrastructure projects.
- 6.3.8. Section 15 of the NPPF: Conserving and Enhancing the Natural Environment paragraphs 174-187 identify a number of principles which should be applied. Those of relevance to this assessment include the application of a strategic approach to protect, restore and enhance priority habitats and ecological networks and protect and encourage the recovery of priority species, and the promotion of opportunities to secure measurable net gains for biodiversity. The NPPF furthermore states that planning applications should be refused if significant harm cannot be avoided, mitigated or compensated, or if development would result in the loss or deterioration of 'irreplaceable' habitats unless the need for, and benefits of, the development in that location clearly outweigh the loss.

Local Context

Adopted Cherwell Local Plan (2011-2031) Part 1¹⁴

6.3.9. The adopted Local Plan sets includes the following relevant local policies:

Policy ESD 9: Protection of the Oxford Meadows SAC

“Developers will be required to demonstrate that:

- *During construction of the development there will be no adverse effects on the water quality or quantity of any adjacent or nearby watercourse*
- *During operation of the development any run-off of water into adjacent or surrounding watercourses will meet Environmental Quality Standards (and where necessary oil interceptors, silt traps and Sustainable Drainage Systems will be included)*
- *New development will not significantly alter groundwater flows and that the hydrological regime of the Oxford Meadows SAC is maintained in terms of water quantity and quality*
- *Run-off rates of surface water from the development will be maintained at greenfield rates.”*

Policy ESD 10 Protection and Enhancement of Biodiversity and the Natural Environment

“Protection and enhancement of biodiversity and the natural environment will be achieved by the following:

- *In considering proposals for development, a net gain in biodiversity will be sought by protecting, managing, enhancing and extending existing resources, and by creating new resources.*
- *The protection of trees will be encouraged, with an aim to increase the number of trees in the District.*
- *The reuse of soils will be sought.*
- *If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or as a last resort, compensated for, then development will not be permitted.*

¹⁴ Cherwell District Council North Oxfordshire 2015. *The Cherwell Local Plan 2011 – 2031. Part 1 Adopted 20 July 2015. Page 106.*

- *Development which would result in damage to or loss of a site of international value will be subject to the Habitats Regulations Assessment process and will not be permitted unless it can be demonstrated that there will be no likely significant effects on the international site or that effects can be mitigated.*
- *Development which would result in damage to or loss of a site of biodiversity or geological value of national importance will not be permitted unless the benefits of the development clearly outweigh the harm it would cause to the site and the wider national network of SSSIs, and the loss can be mitigated to achieve a net gain in biodiversity/geodiversity.*
- *Development which would result in damage to or loss of a site of biodiversity or geological value of regional or local importance including habitats of species of principal importance for biodiversity will not be permitted unless the benefits of the development clearly outweigh the harm it would cause to the site, and the loss can be mitigated to achieve a net gain in biodiversity/geodiversity.*
- *Development proposals will be expected to incorporate features to encourage biodiversity, and retain and where possible enhance existing features of nature conservation value within the site. Existing ecological networks should be identified and maintained to avoid habitat fragmentation, and ecological corridors should form an essential component of green infrastructure provision in association with new development to ensure habitat connectivity.*
- *Relevant habitat and species surveys and associated reports will be required to accompany planning applications which may affect a site, habitat or species of known or potential ecological value.*
- *Air quality assessments will also be required for development proposals that would be likely to have a significantly adverse impact on biodiversity by generating an increase in air pollution.*
- *Planning conditions/obligations will be used to secure net gains in biodiversity by helping to deliver Biodiversity Action Plan targets and/or meeting the aims of Conservation Target Areas. Developments for which these are the principal aims will be viewed favourably.*
- *A monitoring and management plan will be required for biodiversity features on site to ensure their long-term suitable management.”*

Policy ESD 11 Conservation Target Areas

6.3.10. This policy is specific to development sites that lie within or adjacent to Conservation Target Areas and states that:

Where development is proposed within or adjacent to a Conservation Target Area biodiversity surveys and a report will be required to identify constraints and

opportunities for biodiversity enhancement. Development which would prevent the aims of a Conservation Target Area being achieved will not be permitted. Where there is potential for development, the design and layout of the development, planning conditions or obligations will be used to secure biodiversity enhancement to help achieve the aims of the Conservation Target Area.

- 6.3.11. Conservation Target Areas (CTAs) comprise the system used in Oxfordshire to identify “*...the most important areas for wildlife conservation in Oxfordshire, where targeted action will have the greatest benefit*”¹⁵. These additionally incorporate surrounding land considered suitable to be used to buffer and link priority areas with the aim of enhancing habitat connectivity across landscapes.

Policy EDS 17 Green Infrastructure

- 6.3.12. This policy states that:

“The District’s green infrastructure network will be maintained enhanced through the following measures:

- Pursuing opportunities for joint working to maintain and improve the green infrastructure network, whilst protecting sites of importance for nature conservation.
- Protecting and enhancing existing sites and features forming part of the green infrastructure network and improving sustainable connectivity between sites...
- Ensuring that green infrastructure network considerations are integral to the planning of new development. Proposals should maximise the opportunity to maintain and extend green infrastructure links to form a multi-functional network of open space, providing opportunities for walking and cycling, and connecting the towns to the urban fringe and the wider countryside beyond
- All strategic development sites (Section C: ‘Policies for Cherwell’s Places’) will be required to incorporate green infrastructure provision and proposals should include details for future management and maintenance.”

Cherwell Local Plan (2011-2031) Part 216

- 6.3.13. The emerging Cherwell Local Plan (2011-2031) Part 2 has reached the Regulation 18 consultation stage. With reference to the natural environment, this identifies “*the need for more detailed Development Management policies on biodiversity enhancement*” and “*consider the need for additional guidance on areas of tranquillity*”.

¹⁵ Wild Oxfordshire. 2020. *Conservation Target Areas*. Available at: <https://www.wildoxfordshire.org.uk/biodiversity/conservation-target-areas/> [Accessed 28/03/2022].

¹⁶ Cherwell District Council (2016) The Cherwell Local Plan 2011 – 2031 (Part 2) Development Management Policies and Sites. Issue Consultation [Online]. Available from: <http://modgov.cherwell.gov.uk/mgConvert2PDF.aspx?ID=30942> [Accessed 31/03/22]

Legislative Framework

- 6.3.14. In addition to the National, Regional and Local policies, the following legislation and European Directives afford protection to wildlife and have been used to inform this assessment:
- Natural Environment and Rural Communities Act 2006 (NERC)¹⁷;
 - The Conservation of Habitats & Species Regulations (as amended) 2017;
 - Wildlife and Countryside Act (1981) (as amended) (WCA)¹⁸;
 - The EC Birds Directive (Directive 79/409/EEC), as translated into UK law by The Habitat and Species Regulations 2017;
 - The EC Habitats Directive (Directive 92/43/EEC) as translated into UK law by The Conservation of Habitats and Species Regulations 2017;
 - The Protection of Badgers Act (1992);
 - The Hedgerows Regulations (1997)¹⁹ and
 - The Environment Act (2021)²⁰
- 6.3.15. The Conservation of Habitats & Species Regulation 2017 (as amended)²¹ transposes the European Council Directive 92/43/EEC (EC Habitats Directive) into national law. The purpose of this legislation is to provide protection for natural habitats, wild flora and fauna of international importance. A number of species including bats and great crested newts are afforded wide-ranging protection under Schedule 2 of the Regulations.
- 6.3.16. Part 2 of the Regulations affords protection to sites of International importance for habitats or species which rely on these habitats, such as: RAMSAR sites; SACs, and SPAs. Part 3 of the Regulations provides protection for species (plant and animals) as listed on Schedules 2 and 4 that are considered to be of importance. Such species include great crested newts. Part 5 of the Regulations provides a mechanism by which a licence can be obtained for operations that would otherwise be unlawful under the Regulations.
- 6.3.17. The Wildlife and Countryside Act 1981 (as amended) provides protection for all species of wild birds while on the nest until the chicks have fledged the nest. Bird species listed in Schedule 1 of the Act are afforded protection at all times. Schedule 5 of the Act provides statutory protection for several species including bats, great crested newts, nesting birds, water voles and reptiles.

¹⁷ Natural Environment and Rural Communities Act 2006 (c 16) HMSO, London

¹⁸ The Wildlife and Countryside Act 1981 (as amended) (c 69) HMSO, London

¹⁹ Hedgerow Regulations 1997 (SI 1997/1160)

²⁰ <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>

²¹ [http://www.legislation.gov.uk/ukssi/2017/1012/contents/made](http://www.legislation.gov.uk/ukksi/2017/1012/contents/made)

- 6.3.18. Part 2 of the Act provides protection for areas of the countryside recognised for their nature conservation or geological value, including SSSIs and National Parks.
- 6.3.19. The Natural Environment and Rural Communities Act 2006²² provides protection for habitats or species that are considered to be of principal importance to biodiversity. The legislation requires public authorities, including local planning authorities, to conserve biodiversity when exercising their functions. A list of habitats/species of principal importance has been produced by the Secretary of State in consultation with Natural England.
- 6.3.20. The Environment Act 2021 makes provision about targets, plans and policies for improving the natural environment; for statements and reports about environmental protection; for the Office for Environmental Protection; about waste and resource efficiency; about air quality; for the recall of products that fail to meet environmental standards; about water; about nature and biodiversity; for conservation covenants; about the regulation of chemicals; and for connected purposes. Of significance to this scheme, Section 99 and Schedule 15 of the Act introduce the requirement for a minimum of 10% biodiversity net gain to be delivered by Nationally Significant Infrastructure Projects in England in relation to decisions of the Secretary of State.
- 6.3.21. Whilst the Environment Act received Royal Assent in November 2021, few of its provisions came into force, and those that didn't will require secondary legislation for this to happen. Consequently, Part 6 of the Act (Nature and Biodiversity), which encompasses Schedule 15 will require secondary legislation before it comes into force. Currently, this is not expected to happen before November 2023. Nevertheless an initial Biodiversity Impact Assessment has been undertaken based on the proposals as described by the Parameters Plan and Illustrative Masterplan and using the DEFRA 3.0 metric. Whilst this assessment necessarily relies on a number of assumptions regarding the detailed scheme it demonstrates that the scheme is capable of delivering a 10% net gain to biodiversity.

Other Conservation Priorities

- 6.3.22. Red list bird species are those that are globally threatened, whose population or range has declined rapidly in recent years (i.e. by > 50% in 25 years), or which have declined historically and have not recovered. The population status of birds in the UK has been assessed and is compiled in *Birds of Conservation Concern 5*²³.
- 6.3.23. Leading governmental and non-governmental conservation organisations in England have measured the status of England's flora against standardised IUCN criteria which

²² <https://www.legislation.gov.uk/ukpga/2006/16/contents>

²³ Stanbury et al., 2021. *The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and the Isle of Man and IUCN Red List assessment of extinction risk for Great Britain*. British Birds 114:723-747

are assessed and listed in ‘A Vascular Plant Red List for England’²⁴. Local Oxfordshire field botanists have reviewed the 274 species found to be threatened in Oxfordshire and have produced: ‘Oxfordshire’s Threatened Plants’²⁵.

Non-Statutory Plans & Other Guidance

Biodiversity Action Plans

- 6.3.24. The UK Post-2010 Biodiversity Framework succeeds the UK Biodiversity Action Plan (UK BAP). This framework aims to implement the 1992 Convention on Biological Diversity, to protect rare or declining habitats and species by targeting those identified as being of UK priority, with specific actions to reduce their rarity and decline, and additionally sets out the priorities for UK-level work to support the Convention’s Strategic Plan for Biodiversity 2011-2020 and agreed strategic goals and targets. Species and habitats of Principal Importance for the purpose of conserving biodiversity under S41 of the NERC Act (2006) continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework.
- 6.3.25. In England the focus is on delivering the outcomes set out in the Government’s Biodiversity 2020 Strategy²⁶ which sets out how environment quality will be improved and follows on from policies contained in the Natural Environment White Paper (2011)²⁷.
- 6.3.26. Under the Countryside and Rights of Way Act (CROW) (2000)²⁸ and the NERC Act (2006)²⁹ the government and Local Authorities have a duty to extend regard to biodiversity in so far as this is consistent with the proper exercise of their function. At a more local level, the Local BAP (LBAP) targets those species of specific relevance to the county. The site is covered by the Oxfordshire Biodiversity Action Plan and Conservation Target Areas³⁰ (see Figure 1a of **Appendix 6.1**).
- 6.3.27. The following UK and/or LBAP priority species are of potential relevance to the Proposed Development, due to either their widespread distribution, existing local records and/or the site’s suitability.

²⁴ Stroh, P. A. Leach, S. J., August, T. A. et al. 2014. *A Vascular Plant Red List for England*. Botanical Society of Britain and Ireland, Bristol.

²⁵ Erskine, S. E., Killick, H.J., Lambrick, C. R and Lee, E. M. 2018. *Oxfordshire’s Threatened Plants*. Piesces Publications, Newbury.

²⁶ <https://www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services>

²⁷ <https://www.gov.uk/government/publications/natural-environment-white-paper-implementation-updates>

²⁸ <https://www.legislation.gov.uk/ukpga/2000/37/contents>

²⁹ <https://www.legislation.gov.uk/ukpga/2006/16/contents>

³⁰<https://www2.oxfordshire.gov.uk/cms/sites/default/files/folders/documents/environmentandplanning/countryside/naturelenvironment/BAPnewsletterFINAL.pdf>

Table 6.2 Species and Habitats of Principle Importance (S41 NERC Act (2006)) and Local BAP Species of Relevant to this Assessment:

Priority Habitat or Species	S41 NERC Act (2006)	Oxfordshire Biodiversity Action Plan
Lowland Calcareous Grassland	✓	✓
Neutral Grassland	✓	✓
Lowland Mixed Deciduous Woodland	✓	✓
Hedgerows	✓	✓
Ponds	✓	✓
Arable field margins	✓	✓
Veteran trees	✓	
Meadow clary		✓
Badger		✓
Great crested newt	✓	✓
Common lizard	✓	✓
Grass snake	✓	✓
Slow worm	✓	✓
Brown Hare	✓	✓
Water vole	✓	✓
Otter	✓	✓
Barbastelle	✓	✓
Soprano pipistrelle	✓	✓
Brown long-eared bat	✓	✓
Noctule	✓	✓
All other bats		✓
Barn owl		✓
House sparrow	✓	
Field fare		✓
Linnet	✓	
Song thrush	✓	✓
Skylark	✓	
Dunnock	✓	
Yellow wagtail	✓	✓
Starling	✓	
Yellowhammer	✓	

6.4. BASELINE CONDITIONS

Desktop Study

- 6.4.1. The locations of sites of nature conservation interest relevant to the Proposed Development are illustrated in **Appendix 6.1** (Figures 1a and 1b), and historical records of protected and notable species are shown in Figures 2a and 2b. The following section describes the location of these records.

Statutory Designated Sites of Nature Conservation Interest

- 6.4.2. One statutory site of international importance is present within 15km of the Proposed Development. At its closest point the Oxford Meadows SAC lies c.13.6km to the south-west of the Middleton Stoney Relief Road. The SAC supports lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*), an Annex I habitat for which it is considered to be one of the best examples in the UK. Furthermore, the SAC is the only known outstanding locality for the Annex II species creeping marshwort *Apium repens*.
- 6.4.3. Ardley Cutting and Quarry Site SSSI was notified for its geological and biological interest and encompasses an area of 40.13ha, part of which lies along the north-eastern site boundary of the Main Site adjacent to the Chiltern Main Line railway. The geological interest of this SSSI concerns Jurassic rock exposures whereas the biological interest relates to the presence of limestone (calcareous) grassland, along with scrub, ancient woodland and wetland habitats. This designation also supports fauna interest including butterflies of calcareous grassland such as brown argus *Aricia agestis* and Duke of Burgundy butterfly *Hamearis lucina* and part of a great crested newt population. The parts of the SSSI which lie within the Application Site have been subject to Phase 2 survey, with the type and distribution of habitats mapped, the detailed findings of which are presented in **Appendix 6.2**.
- 6.4.4. The Proposed Development lies within four Impact Risk Zones (IRZs) of the Ardley Cutting and Quarry SSSI³¹ and meets the criteria, as defined by Natural England, to represent a potential risk to the integrity of the SSSI. Ardley Cutting and Quarry SSSI is a site of **National** level importance.
- 6.4.5. Ardley Trackways SSSI lies partly within the Application Site at its south-eastern extent. As this SSSI is designated for its geological interest only it is not considered further within this chapter but is considered within Chapter 11.
- 6.4.6. There are no other designated statutory sites of national importance within 2km of the Proposed Development that are designated for their nature conservation value.

³¹ <https://magic.defra.gov.uk/MagicMap.aspx>

Non-Statutory Sites of Nature Conservation Interest (Figure 1a in Appendix 6.1)

- 6.4.7. The Main Site and part of the Middleton Stoney Relief Road area are located almost entirely within the recently established Ardley and Heyford Conservation Target Area (CTA). The CTA has five targets: i) calcareous grassland, ii) hedgerows, iii) grassland management, iv) great crested newt, and v) geological conservation. Tusmore and Shellswell Park CTA lies c.200m to the east of the Highway Works.
- 6.4.8. The desk study identified six LWSs, a single Cherwell District Wildlife Site (DWS) and three Proposed Cherwell District Wildlife Sites (pDWS) within 1km of the Order Limits boundary.
- 6.4.9. Ardley Road Verge Nature Reserve DWS lies mostly adjacent the Main Site to the south east, but where this extends away from the road verge slightly this coincides with the Main Site. The verge and associated grassland support rank grassland, rough calcareous grassland, scrub and hedgerows. The sward is grass dominated but includes species-rich areas with a range of broadleaved herbs, including species typical of unimproved grassland such as field scabious *Knautia arvensis*, greater knapweed *Centaurea scabiosa*, meadow vetchling *Lathyrus pratensis* and lady's bedstraw *Galium verum*. The wider central section of the site supports a population of the rare plant meadow clary *Salvia pratensis* and therefore this site is identified as being of County level importance.
- 6.4.10. Upper Heyford Airfield LWS lies adjacent to the western Main Site boundary and supports areas of species-rich calcareous grassland and notable species including bee orchid *Ophrys apifera*, dwarf thistle *Cirsium acaule*, GCN and bird species.
- 6.4.11. Ardley Fields Quarry LWS coincident with the northern section of Ardley Trackways SSSI comprises a restored quarry which supports species-rich grassland, young tree planting, ponds and wet ditches.
- 6.4.12. Ardley Fields Ponds West LWS and Ardley Fields Pond East lie 15m and 670m to the east of the Main Site, on the opposite side of the B430. Both sites support breeding GCN populations.
- 6.4.13. Stoke Wood LWS comprises a good-sized woodland block encompassing ancient woodland as well as more recently established woodland c.200m east of the proposed Junction 40 improvement works. The extent of the woodland is largely co-incident with the boundary of Tusmore and Shellswell Park CTA.
- 6.4.14. Trow Pool LWS is located approximately 900m east of the Main Site boundary and comprises two pools heavily vegetated by a good diversity of flora, one of which supports a large carp population.
- 6.4.15. The Heath pDWS and Trackway adjacent to The Gorse pDWS lie adjacent to the south-western Main Site boundary and extend to between 15m and c.990m east.

These support areas of species-rich grasslands, woodlands and associated waterbodies. Full details are provided within **Appendix 6.1**. For this assessment the potential DWSs have been identified as being of **Local** level importance, whilst all other sites have been identified as being of **County** level importance.

Protected or Notable Fauna

- 6.4.16. Several records of protected or notable species were identified within the Main Site and neighbouring habitats. These are displayed on Figure 2a within **Appendix 6.1** and include at least two species of bat, five species of amphibian, two species of reptile, numerous bird records including several Schedule 1 species and Birds of Conservation Concern (Red List), riparian species associated with the River Swift including otter, as well as badger, hedgehog *Erinaceus europaeus*, brown hare *Lepus europaeus* and polecat *Mustela putorius*.

Field Survey

Some surveys are continuing and so the contents of the paragraphs below describing the habitats and fauna surveyed are provisional.

Habitats

- 6.4.17. The full descriptions of habitats are provided at **Appendix 6.1** and are shown at Figure 3 within **Appendix 6.1**. The locations of the mature trees are provided in the Arboricultural Assessment (**Appendix 6.7**: Drawing Reference 2-10).

Grassland

Main Site

- 6.4.18. The highest valued ecological feature within the Main Site is part of the Ardley Cutting and Quarry SSSI. A detailed botanical survey was undertaken on 24th and 26th August 2020 along a 2km stretch of the southern cutting embankment, extending from the northwest to northeast of the Main Site. The SSSI citation notes unimproved limestone grassland as a key feature and describes this as being "...a characteristically tall sward either dominated by upright brome *Bromopsis erectus* or a mixture of brome and tor-grass *Brachypodium pinnatum* (Syn. *Brachypodium rupestre*).” and gives examples of key species associated with limestone grassland that occur within the sward.
- 6.4.19. Whilst open grassland formed a large proportion of the surveyed area, extensive tracts of dense and continuous scrub and early secondary semi-natural broadleaved woodland were also present. The specific grassland communities noted in the citation were absent, but in areas the sward was dominated by tor-grass and indicative of the National Vegetation Classification (NVC) CG4 Tor-grass *Brachypodium pinnatum* grassland. In many areas the sward was formed by a mesotrophic grassland

community rather than a calcicolous type, but specifically stands highly indicative of the National Vegetation Classification (NVC) MG1d False Oat-grass (*Arrhenatherum elatius*) grassland, Wild Parsnip (*Pastinaca sativa* ssp. *sylvestris*) sub-community, and MG1e False Oat-grass grassland, Common Knapweed (*Centaurea nigra*) sub-community. These are the more species-rich sub-communities of false oat-grass grassland, particularly MG1e. MG1d characteristically occurs on calcareous soils over calcareous bedrock, and whilst MG1e occurs over a range of bedrock types, these include calcareous³². These are all grassland communities that are tall and tussocky in stature and structure. In a very small number of locations a short tight sward was present and here species-richness was very high with 25-27 species/m² noted in some areas, with many species indicative of the calcareous conditions. Whilst none of these areas had any correlation with published NVC communities, they still represent species-rich limestone grassland, and are of considerable significance.

- 6.4.20. Whilst many of the species forming the scrub and woodland elements occur on a range of soil type, the calcareous conditions were marked by the presence of species such as whitebeam *Sorbus aria* agg. buckthorn *Rhamnus cathartica* and traveller's-joy *Clematis vitalba*.
- 6.4.21. Whilst the scrub and early secondary semi-natural woodland habitats are only of Local (Site) level importance the CG4, MG1d and MG1e grasslands, are grasslands of high botanical nature conservation value with CG4 corresponding to 'Lowland Calcareous Grassland' Habitat of Principal Importance, and MG1d/e corresponding to 'Lowland Meadows' Habitat of Principal Importance³³ and are considered to be of **National** level importance.
- 6.4.22. To account for changes in the Application Site since the 2020 survey, further detailed botanical survey are scheduled for June 2022.
- 6.4.23. Survey of the Ardley Road Verge Nature Reserve DWS recorded a mosaic of species-poor semi-improved grassland, rough calcareous grassland, scrub and hedgerows. The narrower sections of the verge were dominated by coarse grasses including false-oat grass *Arrhenatherum elatius* and cock's-foot *Dactylis glomerata* and supported ruderal species, whereas the wider central area of grassland supported a small number of species typical of lowland calcareous grassland and unimproved neutral grassland which included field scabious *Knautia arvensis*, greater

³² Rodwell, J.S, (Ed.), Pigott, C.D., Ratcliffe, D.A., Malloch, A.J.C., Birks, H.J.B., Proctor, M.C.F., Shimwell, D.W., Huntley, J.P., Radford, E., Wigginton, M.J., and Wilkins, P. 1992. *British Plant Communities Volume 3 Grasslands and Montane Communities*. Cambridge: Cambridge University Press.

³³ Jefferson, R.G., Smith, S.L.N., & MacKintosh, E.J. 2019. *Guidelines for the Selection of Biological SSSIs Part 2: Detailed Guidelines for Habitats and Species Groups Chapter 3 Lowland Grasslands*. Peterborough: Joint Nature Conservation Committee. Available from: <https://data.jncc.gov.uk/data/cf50f420-1b38-4253-89f8-1cb7ba010f27/SSSI-Guidelines-3-LowlandGrasslands-2019.pdf> [Accessed 31/03/2022].

knapweed *Centaurea scabiosa*, common knapweed *Centaurea nigra*, tor-grass *Brachypodium pinnatum*, and woolly thistle *Cirsium eriophorum*. The area was confirmed to still support a small population of meadow clary *Salvi pratensis*, a species listed on Schedule 8 of the WCA, located within two fenced-off areas. It was apparent that limited management had been undertaken and, as a result, the grassland is dominated by grass species and is in decline due to encroaching scrub and tall ruderal species including rosebay willowherb *Chamaenerion angustifolium*. The site however was considered to still meet selection criteria and is of **Local** level importance.

- 6.4.24. The majority of the remaining areas within the Main Site comprise improved and species-poor semi-improved grassland field compartments. These habitats support limited botanical diversity and are common / widespread locally, often with regular management or disturbance and no associated notable species. Therefore, they were identified as being of no more than **Local** level importance.
- 6.4.25. Smaller areas of neutral semi-improved grassland were associated with the western road verge of the B430 adjacent to hedgerows H61 & H62. These areas are more botanically diverse than neighbouring areas of grassland, though are not sufficiently diverse to meet LWS criteria. They are considered to be of no more than **Local** level importance.

Highway Works

- 6.4.26. Areas of poor semi-improved grassland and smaller areas of semi-improved neutral grassland are located on the road verges associated with Junction 10 and the M40 that will be affected by the Highway Works. Some areas include a reasonable diversity of forbs that are typical of neutral grasslands and some species commonly recorded in calcareous conditions, influenced by the underling lime-rich soils. Small numbers of pyramidal orchid *Anacamptis pyramidalis* were recorded within the verge to the west of Baynards Green roundabout and grassland surrounding the attenuation ponds. None of the plant communities associated with these verges are considered to be of sufficient diversity to qualify as Habitat of Principle Importance, BAP Priority Habitat or LWS habitat and it is likely that similar communities are also associated with the road verges in the surrounding area. Such habitats are considered to be of no more than **Local** level importance.
- 6.4.27. A compartment of unmanaged species-poor grassland lies south of the railway line within the Viridor ERF site. Here the sward was dominate by false-oat grass with occasional ruderal species distributed throughout including common ragwort *Jacobaea vulgaris* creeping thistle *Cirsium arvense* and spear thistle *Cirsium vulgare*. To the north of the railway line the sward was botanically more diverse and included crested dog's-tail *Cynosurus cristatus*, red fescue *Festuca rubra* agg., wild carrot *Daucus carota*, bird's-foot trefoil *Lotus corniculatus*, common knapweed, common mouse-ear *Cerastium fontanum*, yarrow *Achillea millefolium* and creeping cinquefoil

Potentilla reptans. These areas were not considered to be sufficiently diverse to meet the LWS selection guidelines, and therefore are considered to be of no more than **Local** level importance. Like many of the patches of semi-improved neutral grassland within the Application Site there is an indication of a calcareous influence; marked here by the presence of occasional wild parsnip *Pastinaca sativa* and woolly thistle.

- 6.4.28. A field compartment of semi-improved neutral grassland is located to the south of the Middleton Stoney Relief Road route and extends beyond it. The sward includes yellow oat-grass *Trisetum flavescens*, crested dog's-tail, Yorkshire fog *Holcus lanatus*, false oat-grass, red fescue, ox-eye daisy *Leucanthemum vulgare*, ribwort plantain *Plantago lanceolata*, lesser trefoil *Trifolium dubium* and small amounts of yellow rattle *Rhinanthus minor*. The grassland is managed for silage and is known to have been created at least 15 years ago as part of a Higher Level Stewardship scheme. The management has since been relaxed and the sward supports a number of ruderal species and is dominated by a small number of herb species. Given its overall botanical diversity is however considered to be of **Local** level importance.

Arable Land

- 6.4.29. Arable land formed the main component of the Main Site and several parts of the Highway Works areas. Arable compartments by their very nature support little semi-natural vegetation and have limited floral diversity. These compartments were generally large with botanical interest restricted to field margins. Arable field margins were variable in width ranging from 1-6m and were generally dominated by ruderal herbs and coarse grasses.
- 6.4.30. Arable field margins are both priority habitat types as listed on S41 of the NERC Act 2006 and LBAP priority habitat. The field margins surrounding the arable land do not however provide a mixture of tussocky and fine-leaved grasses which provide a representative example of this habitat. Consequently, the arable land and the associated margins are identified as being of no more than **Local** level importance.

Tall Ruderal Vegetation

- 6.4.31. This habitat bordered most grasslands, waterbodies, watercourses, ditches and hedgerows with the occasional larger patches present where habitats were generally less managed. Abundant and frequent species include willowherb *Epilobium* sp., common nettle *Urtica dioica*, hogweed *Heracleum sphondylium*, wild teasel *Dipsacus fullonum*, bristly ox-tongue *Helminthotheca echioidea*, creeping thistle and cow parsley *Anthriscus sylvestris*. These habitats were of low diversity, are easily replaceable and have **Negligible** nature conservation importance.

Scrub

- 6.4.32. Scattered and dense scrub habitats were recorded in areas of the Main Site. Scattered scrub was largely present at the site boundaries and included species such as dog-rose *Rosa canina* agg., hawthorn *Crataegus monogyna*, bramble *Rubus fruticosus* agg. and elder *Sambucus nigra*. Areas of dense scrub were dominated by bramble, along with species such as hawthorn, wild cherry *Prunus avium* and elder.
- 6.4.33. Areas of dense areas of scrub were also recorded at the peripheries of fields north of the railway line and within more formerly planted areas within the Highway Works area and included species such as hawthorn, hazel *Corylus avellana*, dogwood *Cornus sanguinea* and blackthorn *Prunus spinosa*.
- 6.4.34. From a botanical perspective these habitats are assessed as being of no more than **Local** level importance.

Semi-Natural Woodland

Main Site

- 6.4.35. The key area of this habitat type is the small part of The Heath pDWL of which the northernmost edge lies within the Main Site boundary. The canopy is dominated by sycamore with occasional common ash *Fraxinus excelsior*, English oak *Quercus robur* and beech *Fagus sylvatica*, and with stands of dog's-mercury *Mercurialis perennis* within the ground flora. This designation was identified through the desk study as an area of Priority Habitat and is considered to be of **County** level importance.

Highway Works

- 6.4.36. The key area for this habitat type is an area of riparian woodland along the Gagle Brook which runs through the Middleton Stoney Relief Road area. Canopy species comprise frequent ash with occasional sycamore *Acer pseudoplatanus*, crack willow *Salix x fragilis* and horse-chestnut *Aesculus hippocastanum* and rare occurrence of hybrid black poplar *Populus x canadensis* and beech, with a species-poor ground flora. Established common ivy *Hedera helix* cover was present and the arboricultural survey recorded evidence of ash dieback caused by *Hymenoscyphus fraxineus* and horse chestnut leaf miner *Cameraria ohridella*. This area is considered to be of **Local** level importance for nature conservation.
- 6.4.37. The western edge Sycamore Grove woodland lies within the proposed Highway Works area adjacent to the Cherwell roundabout. This comprises a mix of early mature and mature ash and sycamore with occasional silver birch *Betula pendula* and a sparse shrub layer of field maple *Acer campestre*, hawthorn and blackthorn beneath. Regeneration was noted throughout, with scattered ash and sycamore

seedlings and ground flora included locally frequent patches of dog's-mercury. This woodland is mapped as Lowland Mixed Deciduous Woodland Priority Habitat and provides connectivity to the offsite area of ancient woodland within Stoke Wood LWS. Therefore, this woodland is considered to be of **County** level importance.

Plantation Woodland

Main Site

- 6.4.38. Plantation woodland forms the main woodland type within this part of the Application Site, the majority of which is categorised as mature. Whilst this is mostly broadleaved, this includes a conifer stand and an area of mixed plantation. Typical of this habitat type and age of woodland, the canopy is even-aged and largely arranged in single species blocks, reflecting the planting scheme, the understory is often lacking or poorly defined, deadwood is lacking, and the field-layer is relatively species-poor with few woodland indicator species. As such, these woodlands do not represent Lowland Mixed Deciduous Woodland HPI.

Highway Works

- 6.4.39. Several verge tree groups encompassed early-mature and mature trees. Tree groups created a buffer between the existing highway and farmland in the north of the Highway Works area. Formal planted groups situated on roundabouts often had dense scrappy forms.
- 6.4.40. Small plantation woodland blocks were also located at the edges of arable fields.
- 6.4.41. All areas were mostly homogenous but mature or maturing, contributing to the structural diversity of habitat within the site and providing shelter and foraging opportunities for a range of fauna. As such, plantation woodland habitats within the site are recognised as being of **Local** level importance for nature conservation.

Arboriculture

- 6.4.42. A total of 247 individual trees, 117 groups of trees and four woodlands, one of which lies outside the site boundary, are present within the 'Order Limits' (**Appendix 6.7**). The majority of trees are associated with hedgerows and are in variable condition as is typical of trees associated with farmland. Evidence of the following was noted: browsing damage, storm damage, pruned lower branches to provide clearance for machinery, and the cultivation of fields close to tree stems.
- 6.4.43. The majority of the individual trees (211) and groups of trees (115) were recorded as being of within Categories B and C of the category's definition set out in Chapter 4 of BS5837. Only 18 individual trees and a single woodland were recorded as being of high arbicultural quality and within Category A.

- 6.4.44. Although the mature trees do add to the structural diversity of the habitats with which they are associated, in their own right they represent a common and widespread habitat and are of no more than **Local** level importance.
- 6.4.45. Of the assessed trees, only one, T170, an ash situated outside of the 'Main Site' but within the 'Development Area' was considered to be a Veteran, based on a range of current published guidance and resources. This tree had sufficient girth and supporting sufficient veteran features, including a decayed and hollowing stem, deadwood and epiphytes to be categorized as a veteran. Considered an irreplaceable habitat, T170 is of **National** level importance.
- 6.4.46. It is understood that there are no Tree Preservation Orders that would apply to any trees present on, or in proximity to the assessment site. The RAF Upper Heyford Conservation Area however abuts the north western boundary of the 'Main Site'. Under the Planning (Listed Buildings and Conservation Areas) Act 1990, a Conservation Area designation provides protection to trees with extra planning controls in place to help the Council manage change in conservation areas so that the special interest can be preserved.

Hedgerows

Main Site

- 6.4.47. There are a total of 51 hedgerows within the area of the Main Site: H1-H42, H58-H62 and H75-H78. These are nearly all species poor, averaging four or fewer woody species per average 30m section of hedgerow, with the exception of hedgerows H3 and H6 which have five or more species. All of hedgerows consist entirely of native species and therefore qualify as a Habitat of Principal Importance and as Priority Habitat of the Oxfordshire BAP. None of the hedgerows within the survey area are of sufficient species or structural diversity to qualify as LWS habitat and as an overall resource are considered to be of **Local** level importance.

Highway Works

- 6.4.48. A total of 28 hedgerows are located within or adjacent to the Highway Works areas of the site: H43-H57, H63-H74 and H78-H79. All consist entirely of native species and therefore qualify as a Habitat of Principal Importance and as Priority Habitat of the Oxfordshire BAP. Furthermore, hedgerows H44, H48, H50, H54, H56, H65 and H70 are considered to be species-rich. Hedgerows H48, H50 and H65 are located adjacent to public rights of way, have good connectivity and a number of mature trees along their length, hence are assessed as being 'Important' according to the wildlife and landscape criteria of the Hedgerow Regulations 1997. Given the hedgerow resource present and available contextual information, it is considered appropriate to classify these three hedgerows as being of **County** level importance. All of the

remaining native hedgerows, including those of comparatively low diversity and poor structure, are considered to be of **Local** level importance.

Watercourses

Main Site

- 6.4.49. Padbury Brook Tributary flows in an easterly direction through the north-western field compartment of the Main Site. The channel is narrow, approximately 3m wide and shallow, approximately 10cm deep with a slow flow and silty substrate. Emergent vegetation includes locally dominant water parsnip *Sium latifolium*. Banks are generally between 0.5-1m high with hedgerow H40 bordering the left bank top.
- 6.4.50. Ashgrove Brook bisects the Main Site from north to south and two ditches located towards the Heyford Park site (ditch D1 along hedgerow H5 and a wet ditch along H16 (see Figure 3c within **Appendix 6.1**) feed into this brook. The main brook channel is approximately 1-3m wide and shallow (c.5-20cm deep) with a silty substrate and slow to moderate flow. Banks varied along the length from shallow and heavily poached to approximately 0.5m high and over 45°. Overall emergent vegetation is sparse, limited to locally occasional patches of fool's water-cress *Helosciadium nodiflorum* and great willowherb *Epilobium hirsutum*. The banks supported a mixture of vegetation including species-poor semi-improved grassland, tall ruderal vegetation and plantation woodland.
- 6.4.51. The above watercourse sections provide some diversity to the site and overall are recognised as being of **Local** level importance.

Highway Works

- 6.4.52. The Gagle Brook flows south through the proposed Middleton Stoney Relief Road area. The gentle sloping banks are between 0.5-1m width and both bank tops support riparian trees and mature scrub. The channel is approximately 3m wide with a slow flow. The substrate is primarily comprised of earth with some organic matter in the form of leaf debris. Due to the dense canopy shading aquatic/marginal vegetation is limited to occasional stands of fool's water-cress in areas where the canopy is more open.
- 6.4.53. Due to the association and connectivity to valuable habitats including woodland and Trow Pool which lies upstream, as well as its broader value as a water source and a connective corridor, this section of the Gagle Brook is considered to be of **Local** level importance to nature conservation.

Waterbodies

Main Site

- 6.4.54. Five waterbodies occur within the Main Site, comprising three ponds, a double concrete water tank and a disused swimming pool. None of the waterbodies supported notable flora or faunal and together these have a minimal contribution to the wetland resource and biodiversity value of the site. The waterbodies therefore are considered to have no more than **Local** level importance. Several waterbodies which comprise ponds and water tanks lie in close vicinity to the Main Site within the disused RAF Upper Heyford airfield to the west and the Viridor ERF site to the east.

Highway Works

- 6.4.55. Two additional ponds occur within the Highway Works areas and a third spans the eastern boundary of the M40 improvement works. These waterbodies are attenuation basins and support dense stands of emergent and marginal vegetation including abundant common reed *Phragmites australis* and locally frequent yellow flag iris *Iris pseudacorus* with frequent patches of common club rush *Schoenoplectus lacustris*. The banks supported semi-improved grassland with stands of scrub and trees at the top of the banks and all were isolated by the road network associated with the motorway and junction. Despite their function as a drainage feature these ponds offer a resource to local fauna, including small number of great crested newts and are identified as being of **County** level importance.

Notable plants

- 6.4.56. The desk study identified records of a number of notable plant species within 1km of the Order Limits boundary (see Figure 2a within **Appendix 6.1**), with these being concentrated in three locations: i) Ardley Road Verge Nature Reserve DWS in the south of the Main site, ii) adjacent to the Ardley Cutting and Tracks SSSI to the north of the Main Site, and iii) Stoke Wood LWS to the north-east. Within the Application Site boundary there were records for five species: meadow clary, night-flowering catchfly *Silene noctiflora*, bloody crane's-bill *Geranium sanguineum*, field scabious, and many-leaved sedge *Carex divulsa* subsp. *leersii*.
- 6.4.57. Meadow clary is listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) and is therefore protected from intentional picking, uprooting or destruction³⁴ and is classified as Near Threatened on the Vascular Plant Red List for England³⁵ and overall is a nationally scarce species. The small population recorded

³⁴ <https://www.legislation.gov.uk/ukpga/1981/69/schedule/8>

³⁵ Stroh, P. A. Leach, S. J., August, T. A. et al. (2014) *A Vascular Plant Red List for England*. Botanical Society of Britain and Ireland, Bristol.

at the Ardley Road Verge Nature Reserve DWS is therefore considered to be of **County** importance. Field scabious which was also recorded within the designation in low abundance is similarly categorized as Near Threatened but is not listed on the local rare plant register and generally is a more widespread species. It is therefore considered to be of **Local** level importance.

- 6.4.58. Night flowering catch-fly and many-leaved sedge are classified as Scarce within the rare plant register for Oxfordshire³⁶. The record for night-flowering catchfly was dated 2011 and was recorded along the verge of the B430, and the record for many-leaved sedge was dated 2018 and was located further south along the same road verge towards the south of the Main Site. These two species were not recorded during the various ecological surveys undertaken across the site and are therefore not deemed to be extant and are not considered further in this assessment.

Other Habitats

- 6.4.59. Other habitats occurring within the site included a small area of amenity grassland within a small area of public open space at the Ardley Road/B430 junction. This habitat is considered to be of **Local** value. Extensive areas of tarmac and concrete hardstanding and buildings have negligible ecological value.

Fauna

- 6.4.60. The following section summarises and evaluates the ecological importance of fauna within the Site. Further survey data is provided in **Appendix 6.1** and **Appendices 6.3 to 6.6**.

Badger

- 6.4.61. The full results of the assessment of the badger survey are confidential and can be provided upon request. In brief, the surveys have confirmed that badgers make use of the Main Site and the Highways Areas and the surrounding area. Badgers are a common and widespread species and based upon the associated levels of activity the populations present are considered to be of **Local** level importance.

Bats

Roosts – Buildings

- 6.4.62. Twelve buildings/built structures are present within the Application Site (B1-B12), all located within the Main Site. Of these, buildings B1-B9 were associated with Ashgrove Farm, buildings B10 and B11 comprised a pair of semi-detached cottages

³⁶ Erskine, S. E., Killick, H.J., Lambrick, C. R and Lee, E. M (2018) *Oxfordshire's Threatened Plants*. Piesces Publications, Newbury.

and detached garage, and B12 a structure forming part of the Seven Trent Green Power 'In Vessel Compositing' facility towards the south-east

- 6.4.63. Each was visually assessed internally (where access was possible) and externally for evidence of bat activity (e.g. droppings, food remains) and for their potential to support roosting bats. Buildings B1 to B3 within Ashgrove Farm each comprised distinct sections therefore sections were assessed both individually and as part of the whole structure. Of these, buildings/sections B2b, B3b, B3c, B3d, B3g, B3h, B4, B6, B7, B8, B9 and B12 are considered to provide **Negligible** potential to be used as a bat roost and are not considered further in this assessment.
- 6.4.64. Following detailed building inspections buildings /sections B1e, B1f, B2a and B3a and B11 were categorized as having low roost potential; buildings B1b, B1c, B3e and B3f as moderate roost potential, and B1a, B1d, B5 and B10 as high potential to support roosting bats, based on the nature of potential access and roost features. Full details and building reference context are provided at **Appendix 6.3**.
- 6.4.65. Nocturnal surveys undertaken in 2019 and 2021 of the low, moderate and high potential buildings/building sections associated with Ashgrove Farm recorded a small number of individual common pipistrelle *Pipistrellus pipistrellus* returning to roost within buildings sections B1a and B1d on four occasions. No bats were observed emerging or returning to roost within any other building surveyed. Common pipistrelle is a common and widespread species and the presence of small roosts in building B1 is considered to be of **Local** level importance.

Roosts - Trees

- 6.4.66. A total of 64 trees with potential to support roosting bats were identified within or closely adjacent to the Site through a combination of ground-level survey and detailed survey with canopy access (aerial survey). Of these, 10 (up to a possible 12, dependent on the final road details) trees within the works area were assessed as having moderate roosting potential and 23 (25) with low bat roosting potential. No trees with high roost potential are located within the works area.
- 6.4.67. Nocturnal survey of six trees unsuitable for detailed inspection via aerial survey in 2021 recorded no evidence of bats emerging or returning to roost within these trees.
- 6.4.68. The presence of a bat roost within an onsite tree or trees is likely to be of at least **Local** level importance for local bat populations. All other trees have **Negligible** value.

Bat Foraging and Commuting

- 6.4.69. Field surveys confirmed that the following bat species utilize habitats within the Proposed Development area: common pipistrelle, soprano pipistrelle *P. pygmaeus*,

brown long-eared bat *Plecotus auritus*, noctule *Nyctalus noctula*, Natusius' pipistrelle *P. nathusii*, barbastelle *Barbastella barbastellus* and serotine *Eptesicus serotinus*, in addition to unidentified *Pipistrellus*, *Myotis*, and *Nyctalus* species.

- 6.4.70. Of the above, barbastelle, brown long-eared bat, noctule and soprano pipistrelle are listed as Species of Principal Importance (s.41 NERC Act 2006) and are Priority Species within the UK BAP, and *Pipistrellus* species are priority species within the Cherwell BAP.
- 6.4.71. Within the Main Site the highest levels of bat activity were noted towards the west, particularly along the shared boundary with the adjacent airfield, along central hedgerows that link to plantation woodland, and vegetation lining the brook in the south of the site. Bat activity was also noted along hedgerows adjacent to the B430 to the east. Within the northern Highway Works area bat activity was concentrated along boundary hedgerows to the north of the railway line, in the vicinity of small plantation blocks at the boundaries of the central arable fields, and along the Padbury Brook tributary. Bat activity within the southern Highway Works area was mainly associated with the tree belt along Gagle Brook and at the peripheries of the adjacent Birch Spinney.
- 6.4.72. Overall bat activity was mostly associated with field perimeter hedgerows/ treelines, watercourses, ponds and woodland/plantation edge habitats with no significant post-dusk and pre-dawn peaks in activity noted indicative of important commuting routes to neighbouring roost sites.
- 6.4.73. Common pipistrelle was consistently the most frequently recorded species during walked transect and static detector surveys, with soprano pipistrelle, noctule/*Nyctalus* sp. brown long-eared bat and *Myotis* sp. bats also regularly recorded, though far less frequently. All are common and widespread species within the UK.
- 6.4.74. Barbastelle bats were recorded occasionally, and Natusius' pipistrelle and serotine rarely (two survey occasions each). Barbastelle and Natusius' pipistrelle are considered widespread but rare within Oxfordshire, and serotine as widespread but infrequently occurring³⁷.
- 6.4.75. The bat species assemblage described by the field data and the relative frequency of activity detected for each species is considered typical of the habitat composition of the site and its geographic context. The Development Site is considered to represent a roosting/foraging/commuting resource of **Local** level importance for each of the individual bat species present.
- 6.4.76. Full details of the above surveys and resulting field data are provided in **Appendix 6.3.**

³⁷ Oxfordshire Mammal Group 2017. *Oxfordshire Mammal Guide*. Oxfordshire Mammal Group.

Great Crested Newts

GCN surveys of some ponds associated with the Highway Works are ongoing. The following summarises the survey data to date.

- 6.4.77. No great crested newts were recorded within any onsite pond; however the species was recorded present within several neighbouring ponds and waterbodies within 500m of the Order Site limits.
- 6.4.78. Great crested newt eggs were recorded within ponds P11, P12, P13, P15, P16, P17, P18, P25, P26, P27, P28, P29, P30, P31, P32 and P34. Ponds P37 and P39 and tank T3 had potential to support breeding GCN but this was limited by their seasonality, each showing a tendency to dry out following prolonged dry weather.
- 6.4.79. Survey work undertaken to date has identified at least three GCN metapopulations offsite; metapopulation A to the west constitutes an ‘Exceptional’ population size, metapopulation B to the east is a ‘Good’ population size and metapopulation C also of ‘Exceptional’ population size (refer to Figure 2 of **Appendix 6.4**). Breeding activity was confirmed in meta populations A and B. There is potentially a fourth metapopulation to the north where the Ardley Bypass is proposed - to be confirmed via survey in spring/summer 2022.
- 6.4.80. The proposals will not divide or sever links to functionally linked habitat likely to sustain Metapopulations A or B. Metapopulation C however spans the railway line and therefore works have the potential, at least temporarily, to inhibit the migration of GCN between ponds north and south of the railway line.
- 6.4.81. Terrestrial habitats within the site and within 250m of GCN breeding ponds offers potentially suitable foraging opportunities for the species as well as places of rest and shelter. Given the legislative protection for this species mitigation shall be required in order to minimise the risk of killing or injuring GCN during site clearance, preserve connectivity across the site between breeding ponds and maintain the favourable population status of the species post development.
- 6.4.82. Overall, the exceptional and good metapopulations of GCN on land surrounding the site have been identified as being of **County** level importance. The value of terrestrial habitat to the species varies depending on the distance to breeding ponds and the quality of habitat. The Main Site and Highway Works areas are dominated by arable fields and open grazed grassland fields, with limited woody vegetation, comprising the field perimeter hedgerows and relatively small areas of woodland/ plantation. Consequently terrestrial habitats within the site are valued as being of **Local** level importance.
- 6.4.83. Full details of the above surveys and resulting field data are provided in **Appendix 6.4**.

Reptiles

- 6.4.84. The arable land and open grazed grassland fields that dominate the site are characterised by largely homogenous and intensively managed habitat that is suboptimal for use by native reptile species. The unmanaged grassland road verges, including those of the M40, do provide some potential opportunities for reptiles to forage and shelter. This habitat is both limited in overall extent and is isolated from any other significant areas of suitable habitat however, therefore is also considered to be suboptimal for reptiles. Given the poor quality and/or fragmented nature of habitats within the Highway Works areas it is considered likely that reptiles are absent from these habitats.
- 6.4.85. Targeted reptile surveys within the main site recorded a small population of common lizard (peak count 4 adults). These were located within the field margins along the northern boundary adjacent to the airfield. A small population of grass snake (peak count 2 adults) and single adult male slow worm were also recorded during surveys. Common lizard, grass snake and slow worm are Species of Principal Importance that are widespread. The small populations of these species present within the Main Site are considered to be of no more than **Local** level importance.
- 6.4.86. Grassland and scrub cover alongside the adjacent railway track embankments provides suitable habitat for reptiles and forms part of a more extensive area that extends far beyond the boundary of the Proposed Development. These habitats display a diversity of vegetation structure, creating potentially suitable areas for reptiles to bask, forage and shelter. The railway embankments remain inaccessible to direct survey therefore the presence/absence of reptiles within these habitats has not been determined.

Highway Works

- 6.4.87. Small, isolated areas of habitat potentially suitable for reptiles within the northern part of the Highway Works around Junction 10 were not directly accessible for reptile survey. The desktop study did not return any existing reptile records from north of this feature.
- 6.4.88. No reptiles were recorded within the southern Highways Works area during the targeted surveys, however a single common lizard was noted as an incidental record during the habitat survey of the southern grassland field compartment within the Middleton Stoney Relief Road area. Common lizard was also recorded on two occasions (peak count 1 individual) within the southern Highways Works area among grassland to the south of the railway line. The field results therefore indicate the presence of small common lizard population within the northern and southern Highway Works areas of up to **Local** level importance.

Birds

Breeding Birds – Main Site

- 6.4.89. During the 2018 breeding bird surveys of the original Main Site boundary, 47 species were recorded, of which 22 were considered confirmed or probable breeders. The remaining species were either possible or non-breeding species. Of the 47 species recorded, 23 are considered notable (i.e., appearing on either the BoCC red / amber lists, Species of Principal Importance or the Wildlife and Countryside Act 1981 (as amended)).
- 6.4.90. The areas subsequently added to the red line south of the original Main Site limits were surveyed in 2020 (see Breeding Bird Survey Plan). These surveys recorded a total of 53 species, of which 27 species were considered confirmed or probable breeders. Of the 53 species recorded, 24 were considered notable.
- 6.4.91. The 2021 updating surveys covered the extended Main Site boundary and recorded a total of 41 species, of which 21 were considered notable. The updating survey in 2021 recorded a similar assemblage to that recorded previously in 2018 and 2020, indicating that the breeding bird assemblage had not undergone a significant change during the intervening period. A small number of additional species were recorded however, including merlin *Falco columbarius*, a notable species observed flying over the site.
- 6.4.92. Arable field compartments and their associated field margins provide breeding opportunities for several farmland bird species, including skylark *Alauda arvensis*, yellow wagtail *Motacilla flava*, yellowhammer *Emberiza citrinella*, kestrel *Falco tinnunculus*, linnet *Linaria cannabina* and corn bunting *Emberiza calandra*. Other species associated with the farmland habitats include starling *Sturnus vulgaris*, hobby *Falco subbuteo* and stonechat *Saxicola rubicola*. Although the farmland bird species recorded have undergone national declines, overall they are considered widespread within the local area. The farmland bird assemblage is therefore considered to be of **Local** level importance.
- 6.4.93. The hedgerows, trees and woodland provide breeding opportunities for a range of widespread bird species such as spotted flycatcher *Muscicapa striata*, stock dove *Columba oenas*, song thrush *Turdus philomelos*, mistle thrush *Turdus viscivorus* and dunnock *Prunella modularis*. This assemblage is considered to be of **Local** level importance overall, with the exception of spotted flycatcher, considered a probable breeder within the site and therefore of **County** level importance given this represents >1% of the county population³⁸.
- 6.4.94. Table 6.3 provides a summary of the birds recorded which are of at least **Local** importance.

³⁸ Oxford Ornithological Society 2018. *Birds of Oxfordshire 2013*.

Table 6.3: Breeding Birds Recorded within the Main Site of at least Local Importance

Name	Status		Importance
	SPI	WCA Sch.1	
Red List			
Skylark	<i>Alauda arvensis</i>	+	Local
Mistle thrush	<i>Turdus viscivorus</i>		Local
Song thrush	<i>Turdus philomelos</i>	+	Local
House sparrow	<i>Passer domesticus</i>	+	Local
Corn bunting	<i>Emberiza calandra</i>	+	Local
Linnet	<i>Linaria cannabina</i>	+	Local
Yellowhammer	<i>Emberiza citrinella</i>	+	Local
Spotted flycatcher	<i>Muscicapa striata</i>		County
Amber List			
Stock dove	<i>Columba oenas</i>		Local
Kestrel	<i>Falco tinniculus</i>		Local
Dunnock	<i>Prunella modularis</i>	+	Local
Green List			
Barn Owl	<i>Tyto alba</i>		+
			Local

Wintering Birds – Main Site

- 6.4.95. The Main Site supported 55 wintering bird species, of which 24 were considered notable. The wintering bird assemblage consisting largely of common, widespread species, but with notable species including grey partridge *Perdix perdix*, lapwing *Vanellus vanellus*, barn owl *Tyto alba*, merlin, skylark and yellowhammer. The over-wintering farmland birds such as grey partridge, lapwing, stock dove, skylark, linnet and yellowhammer were largely associated with open arable habitats and field margins. Other species such as redwing *Turdus iliacus*, fieldfare *Turdus pilaris*, dunnock and bullfinch *Pyrrhula pyrrhula* were associated with hedgerows and scrub.
- 6.4.96. Skylark and yellowhammer were both recorded in excess of the threshold values set within the Local Wildlife Site selection criteria for Berkshire, Buckinghamshire and Oxfordshire (see separate Winter Bird Report for details). This criteria states however that threshold values must be exceeded ‘frequently’, which is defined as threshold values being exceeded in at least three seasons within the last five years, having been present for at least two months each time. As insufficient data has been recorded to establish this, it cannot be assumed that the site meets the LWS criteria based on skylark and yellowhammer numbers. Nonetheless, due to their high recorded numbers within the site, skylark and yellowhammer are considered to be of County level importance. The remaining winter bird assemblage recorded within the Main Site was considered to be of **Local** level importance.

Table 6.4: Wintering Birds Recorded within the Main Site of at least Local Importance

Species	Status		Importance	
	NERC S.41	WCA Sch.1		
Red List				
Grey partridge	<i>Perdix perdix</i>	+	Local	
Merlin	<i>Falco columbarius</i>		+	Local
Skylark	<i>Alauda arvensis</i>	+		County
Starling	<i>Sturnus vulgaris</i>	+		Local
Fieldfare	<i>Turdus pilaris</i>		+	Local
Redwing	<i>Turdus iliacus</i>		+	Local
Song thrush	<i>Turdus philomelos</i>	+		Local
Yellowhammer	<i>Emberiza citrinella</i>	+		County
Amber List				
Lesser black-backed gull	<i>Larus fuscus</i>		Local	
Stock dove	<i>Columba oenas</i>		Local	
Dunnock	<i>Prunella modularis</i>	+		Local
Bullfinch	<i>Pyrrhula pyrrhula</i>	+		Local
Green List				
Barn owl	<i>Tyto alba</i>		+	Local
Peregrine	<i>Falco columarius</i>		+	Local

Breeding Birds – Highway Works

- 6.4.97. Breeding bird surveys of the Highway Works area are ongoing, and a full evaluation of the results will be provided at a later stage. A single survey was carried out in June 2021 and a further two surveys will be carried out in 2022, one each in April and May.
- 6.4.98. The single breeding bird survey of the Highway Works areas undertaken to date recorded 33 species, including six confirmed breeding species and one probable breeding species. Of the 33 species recorded, 12 were considered notable.
- 6.4.99. The Highway Works area predominantly encompasses agricultural land, with some woodland and wetland habitats. The results of the initial survey are largely in line with results from the Main Site, with the bird assemblage recorded being typical of the habitats present. Arable habitats supported notable farmland species such as skylark, yellow wagtail, linnet and yellowhammer, whilst woodland and scrub habitats supported stock dove, kestrel, song thrush, dunnock and bullfinch. The bird assemblage is provisionally considered to be of no more than **Local** level importance, however this assessment will be reviewed following completion of the outstanding surveys.

Wintering Birds – Highway Works

- 6.4.100. Three winter bird surveys were undertaken throughout the Highway Works areas between November 2021 and February 2022. These identified a total of 60 species, of which 34 are considered notable. Arable fields and associated marginal habitats support good numbers of farmland bird species such as skylark, meadow pipit *Anthus pratensis*, yellowhammer, linnet, corn bunting and grey partridge, whilst woodland and scrub habitats provide winter foraging and roosting habitat for fieldfare, redwing, starling, song thrush, dunnock, mistle thrush, bullfinch and wren *Troglodytes troglodytes*. Other notable species recorded include woodcock *Scolopax rusticola*, teal *Anas crecca*, snipe *Gallinago gallinago*, black-headed gull *Chroicocephalus ridibundus*, red kite *Milvus milvus*, barn owl and reed bunting *Emberiza schoeniclus*.
- 6.4.101. Skylark, yellowhammer and corn bunting were recorded in excess of the aforementioned LWS selection criteria. However, as before, data has not been collected for three of the previous five years, therefore it cannot be assumed that the Highway Works area constitutes an LWS based on the numbers of these three species. Nonetheless, skylark, yellowhammer and corn bunting are considered to be of **County** level importance, while the remaining winter bird assemblage within the Highway Works area is considered to be of **Local** level importance.

Riparian Mammals

- 6.4.102. Riparian mammal surveys were undertaken in June and September 2021 of accessible watercourse sections within the site. Due to scheme alterations small areas of suitable habitat within the Highway Works Area still require survey. These include two attenuation basins and a small stretch of ditch to the north, which will be surveyed in 2022.

Main Site

- 6.4.103. The watercourses surveyed within the Main Site comprised sections of Ashgrove Brook and 'Padbury Brook Tributary'. At the time of the June 2021 survey the Padbury Brook Tributary was 0.5-1m wide with a very shallow water level, rarely deeper than 10cm. A tall hedgerow runs along the northern bank of this watercourse, whilst the southern bank is dominated by tall (c.1m) grasses and herbaceous vegetation. This vegetation provides some foraging potential for water vole but also results in a moderate level of overshadowing. By September 2021 the watercourse had dried completely, with no water remaining in the channel.
- 6.4.104. Ashgrove Brook was largely similar in morphology and surrounding habitat to the Padbury Brook Tributary at the time of the June 2021 survey. The water levels were highly variable, with some areas being completely dry, with other areas resembling ephemeral pools. At one point the watercourse flows into a pond, surrounded by trees and scrub, otherwise at its widest this watercourse was c.1m wide and

approximately 10-20cm deep. Areas of dense vegetation comprising common ivy and bramble dominate the brook banks in places. The water level was greatly reduced during the September 2021 survey, with approximately half of the watercourse section within the site being dry.

- 6.4.105. No evidence of water vole or otter was recorded along the Padbury Brook Tributary. Two mammal burrows were recorded, but due to the presence of rat droppings nearby these burrows were considered to be occupied by this species. No evidence of water vole or otter was recorded along the Gagle Brook Tributary.
- 6.4.106. Ashgrove Brook and the Padbury Brook Tributary are considered to offer very limited potential for otter and water vole due to their low water level, tendency to dry out completely, low levels of emergent/bankside plants and high levels of overshading. It may be possible for otter to occasionally use Ashgrove Brook channel for foraging during periods of increased rainfall when the water level is higher, however in general it is not considered to constitute significantly important habitat. These watercourse sections are considered to have up to **Local** level importance for otter and water vole populations, if present locally.

Highway Works

- 6.4.107. The only suitable habitat for otter or water vole within the Highway Works Area is a second section of the Gagle Brook. This is completely surrounded by tall, mature woodland that severely limits the growth of bankside vegetation, which consists mainly of sparsely growing ivy. One short (c.10m) stretch had thick in-channel growth of a watercress species (c.100% coverage). The channel was 1-2m wide with a maximum depth of approximately 30-40cm.
- 6.4.108. Crayfish remains were noted within the Gagle Brook, as well as a mammal hole several metres from the water's edge which potentially could be used by otter. No other otter signs were noted nearby or along the Gagle Brook. Given the absence of corroborating signs, and the close proximity of the hole to a well-used public footpath it is considered very unlikely that this hole constitutes an active otter holt. This brook nevertheless has potential to support otters as part of a far more extensive territory (these may extend up to 35km and 25km for males and females respectively), hence it is considered that the Gagle Brook forms part of an otter territory. This section is therefore also considered to have up to **Local** level importance for otter and water vole populations, if present locally.

Other Protected Species

- 6.4.109. A small number of individual brown hare were recorded within the Main Site as incidental records during site visits. This species is considered to be of **Local** level importance.

Invertebrates

- 6.4.110. The majority of the Main Site and Highway Works areas provide a limited range of habitats suitable to support notable invertebrate species, being dominated by intensively managed habitats of low ecological value to this group. Seven common and widespread butterfly species were noted as incidental records within grassland within the Main Site and commuting along the hedgerows. A single S.41 species, small heath butterfly was observed within the grassland field south of the road that bisects the Main Site during survey work in 2020.
- 6.4.111. Grassland and scrub habitats within the Ardley Cutting and Quarry SSSI provide suitable habitat for butterfly species for which the site has been notified including Duke of Burgundy. Further targeted butterfly surveys are scheduled for June-August 2022 in line with the flight periods of target species.

Summary of Valued Ecological Receptors

- 6.4.112. A summary of the valued ecological receptors as currently identified within the Application Site, and their nature conservation value is provided in Table 6.5.

Table 6.5: Summary of Valued Ecological Receptors

Valued Ecological Receptor	Location and Comments	Nature Conservation Importance
Oxford Meadows SAC	An internally recognised site within the National Sites Network which supports lowland hay meadow Annex I habitat and Annex II species creeping marshwort.	International
Ardley Cutting and Quarry SSSI	A nationally recognised assemblage of habitats of value with biological and geological SSSI status located along the Chiltern line railway. Includes calcareous grassland and supports invertebrate assemblage and GCN population.	National
Ardley and Heyford CTA	A Conservation Target Area that identifies targets for habitat creation and management including calcareous grassland, hedgerows, grassland management, great crested newts and geological conservation.	County
Ardley Road Verge Nature Reserve DWS	A mosaic of calcareous grassland, scrub and hedgerows which supports a population of the rare plant Meadow Clary.	County
Upper Hayfield Airfield LWS, Ardley Fields Ponds West LWS, Ardley Fields Quarry LWS, Ardley Road	Local Wildlife Sites which support assemblages of habitats including calcareous grassland, woodland, breeding GCN populations and bird species.	County

Valued Ecological Receptor	Location and Comments	Nature Conservation Importance
The Heath pDWS, Trackway adjacent to The Gorse pDWS, Kennel Copse pDWS	Potential Cherwell District Wildlife Sites which support species-rich hedgerows and woodland.	Local
Calcareous grassland	Unimproved calcareous grassland with stands of CG4 corresponding to 'Lowland Calcareous Grassland' Habitat of Principle Importance associated with the SSSI and semi-improved calcareous grassland associated with the Ardley Road Verge Nature Reserve DWS within the Main Site.	National
Unimproved neutral grassland	Mestrophic grassland communities MG1d and MG1e corresponding to 'Lowland Meadows' Habitat of Principle Importance associated with the SSSI within the Main Site.	National
Semi-improved neutral grassland	Neutral grasslands with reasonable floral diversity associated with the Main Site and Middleton Stoney Relief Road.	Local
Species-poor semi-improved grassland	Habitat of limited species diversity of common species.	Local
Arable	These habitat types within the site are common and widespread locally and regionally.	Local
Scattered and dense scrub	Scrub is common and widespread locally and regionally.	Local
Semi-natural woodland	Small area of The Heath pDLW located within the Main Site, riparian woodland along Gaggle Brook associated with the Middleton Stoney Relief Road and part of Sycamore Grove Woodland associated with the Junction 10 Highway Work improvements. Identified as 'Lowland Woodland' Habitat of Principle Importance.	Local - County
Plantation woodland	Areas of mixed, deciduous and coniferous woodland within the Main Site were mature and provided structural and some botanical diversity to the site and shelter and foraging for local fauna. Areas of road verge tree groups and plantation blocks at the edges of arable fields associated with the Highway Works.	Local
Veteran tree	Single tree T170 located within the Order Limits Boundary.	National
Trees	Varied species and age represented provided some structural diversity to the site.	Local
Hedgerows	Hedgerows are a common and widespread habitat type locally but provide structural diversity and habitat connectivity as well as a S41 NERC habitat. The hedgerows across the Main Site and Highway Works areas provided a good network of hedgerows and	Local - County

Valued Ecological Receptor	Location and Comments	Nature Conservation Importance
	three hedgerows within the Highway Works Area were identified as being important under the Hedgerow Regulation 1997.	
Watercourses	Limited aquatic and marginal vegetation associated within Padbury Brook Tributary and Ashgrove Brook within the Main Site. Ashgrove Brook is a valuable habitat corridor that runs through the Highway Works areas and beyond the Order Limits.	Local
Waterbodies	Ponds provide a water source and stepping stone habitats for aquatic flora and fauna, however the ponds present were only of poor condition and value to biodiversity.	Local
Notable plants	Meadow clary and field scabious associated with Ardley Road Verge Nature Reserve DWS.	Site - County
Badgers	Badgers are afforded protection under the Protection of Badgers Act 1992. Badgers are present within the site and across the surrounding area.	Local
Bats	All bats protected under EU and UK law with several species being UK priority species. The dominant species identified foraging and commuting throughout the site were common / widespread species. The completed survey work did not confirm significant levels of activity across the site but some linear features (hedgerows, plantation edges, watercourses) were noted to offer foraging and flight line habitats. Over the survey one Annex II species Barbastelle, was identified, with occasional and low level activity recorded. Consequently, the habitats within the site have not been identified as providing a significant foraging resource for these species. A small common pipistrelle roost was confirmed present within building B1. No roost sites were identified in association with trees present on site.	Local
GCN (Breeding habitat)	Protected by EU and UK law. NERC and LBAP priority species. No GCN were identified within any of the on-site ponds. At least three metapopulations were also identified within ponds on land to the west associated with the Upper Heyford Airfields, and to the east and north-east associated with the Viridor ERF site.	County
GCN (Foraging habitat)	Protected by EU and UK law. NERC and LBAP priority species. Majority of site provided little potential foraging or sheltering habitat (arable, semi-improved and	Local

Valued Ecological Receptor	Location and Comments	Nature Conservation Importance
	improved grazed grassland). Hedgerows and scrub areas provide greater opportunities for hibernating, sheltering, commuting and foraging.	
Reptiles	Common lizard and grass snake populations at suitable habitat at the Middleton Stoney Relief Road. Slow worm use of suitable habitat within the Main Site.	Local
Breeding Birds	Up to 53 species were recorded within the Main Site during the 2018 breeding survey surveys, 23 of which were considered notable (i.e. listed as red or amber on the BoCC list, featured under Schedule 1 of WCA 1981 as amended or a NERC species of principal importance). Common and widespread, but declining, farmland bird species were recorded with nesting and foraging activity in the plantation woodland and hedgerows.	Local
	During the initial survey 33 species were recorded within the Highway Work areas during the 2021 winter bird survey surveys, 12 of which were considered notable (i.e. listed as red or amber on the BoCC list, featured under Schedule 1 of WCA 1981 as amended or a NERC species of principal importance).	Local
	Spotted flycatcher is considered a probable breeder within the Main Site.	County
Winter Birds	55 species were recorded using the site over winter, 24 of which were considered notable (i.e. listed as red or amber on the BoCC list, featured under Schedule 1 of WCA 1981 as amended or a NERC species of principal importance).	Local
	High numbers of skylark and yellowhammer recorded within the Main Site.	County
	60 species were recorded using the site over winter, 34 of which were considered notable (i.e. listed as red or amber on the BoCC list, featured under Schedule 1 of WCA 1981 as amended or a NERC species of principal importance).	
	High numbers of skylark and yellowhammer recorded within the Highway Works areas.	County
Water voles	Water vole are afforded partial protection under the Wildlife & Countryside Act 1981 (<i>as amended</i>) and are listed as a species of principle importance on S41 of the NERC Act 2006 and as a local BAP species. No evidence of water vole or suitable habitats to support this species have been recorded within the site.	Negligible

Valued Ecological Receptor	Location and Comments	Nature Conservation Importance
Otter	Protected by EU and UK law. NERC and LBAP priority species. No evidence of otter activity was identified over the survey period. Gaggle Brook within the Highway Works Area is considered to form part of an otter territory. Single record within 1km of the site identified through the desk study.	Local

Future Baseline

- 6.4.113. In the absence of development, and assuming current management practices continue it is anticipated that the application site would be retained as managed agricultural land of limited ecological value, but including ponds, the brook corridors, woodland and plantations, field perimeter hedgerows and associated trees. These would be subject to occasional ongoing management which would maintain them in their current condition and continuing to provide some ecological value and structural diversity across the site.
- 6.4.114. It is further anticipated that the management of the SSSI habitats within and adjacent the Application Site would continue to lie within the remit of Network Rail and would continue as presently. The most recent condition assessment of the Ardley Cutting and Quarry SSSI was completed by Natural England in August and September 2012 which concluded that it was “unfavourable – recovering” condition. The sustained recovery of these habitats is reliant on the application of appropriate management.

Local Conservation Target Areas

- 6.4.115. Of the five conservation targets specific to the Ardley and Heyford CTA, four relate to ecology (the fifth solely concerns geological conservation). These are:
- The management, restoration and creation of calcareous grassland,
 - Management and restoration of hedgerows,
 - Grassland management including buffering to support ground nesting birds, and
 - Management of ponds and terrestrial habitat such as copses and wooded strips to conserve the conservation status of GCN.
- 6.4.116. Land within the Application Site currently largely lies within private ownership, with the remainder comprising land controlled by the Highways Authority and National Rail. As such there is no mechanism currently in operation across the Ardley and Heyford CTA to provide landscape level enhancements for biodiversity, with existing

enhancement restricted to localised endeavours such as the management of ponds within the adjacent airfield and the Ardley Fields Ponds LWSs for the benefit of GCN, and scrub control measures within the Ardley Cutting and Quarry SSSI and Ardley Road Verge DWS. In the absence of development it is assumed that current management practices would continue i.e. there would be no landscape-scale framework in operation across the Ardley and Heyford CTA by which to progress towards the above targets.

Mineral Extraction Works

6.4.117. *This section will consider areas currently undergoing mineral extraction and those areas proposed for future extraction works. The detail will form part of the next version of this Chapter.*

6.5. ASSESSMENT OF LIKELY EFFECTS

- 6.5.1. A full description of the Proposed Development is provided in Chapter 2: Proposed Development. The impacts associated with the construction and operational phases have been assessed having regard to the Parameters Plan and landscape proposals outlined in Chapter 7.
- 6.5.2. Potential impacts in the absence of additional actionable mitigation include:
- Direct loss or gain of habitats and associated flora / fauna within the development area, interruption/enhancement of wildlife corridors, and the change in population density/areas of species and/or habitats;
 - Indirect impacts on retained vegetation within and bordering the Proposed Development area through increase in pedestrian use and local changes in soils, drainage and hydrology;
 - Potential impacts upon protected and scarce species through disturbance;
 - Construction impacts such as pollution incidents from chemical spills, damage to habitats through informal access and imprecise working corridors and effects upon semi-natural habitats from runoff and incorrect storage of materials; and
 - Potential impacts post construction such as degradation through disposal of waste, introduction of possible alien or undesirable species, increases in recreational use leading to trampling and other such effects on fauna and flora.

Mitigation by Design

- 6.5.3. The proposed scheme has been developed via an iterative design process to include consideration of ecological constraints and where possible avoid, reduce or mitigate potential adverse effects on valued ecological receptors, in accordance with the 'mitigation hierarchy' and relevant planning policy. This has resulted in an outline design that incorporates the majority of such features and maintains habitat connectivity throughout the site for a range of priority fauna and flora present on site and in the local area.
- 6.5.4. The Proposed Development for example avoids construction in the vicinity of the retained brook corridors, which will be buffered within broad habitat corridors, and will retain the existing hedgerows and mature trees, including those within woodland/plantation woodland. Where avoidance of all habitats of ecological value has not been possible, the design has sought to avoid those of highest ecological importance and highest sensitivity to effects.
- 6.5.5. The green infrastructure areas shown on the draft Parameters Plan and demonstrated by the Illustrative Landscape Masterplan measure approximately

195ha across both the Main Site and Highways Works areas³⁹, and will deliver native species structural planting with grassland creation. New linear structural planting is proposed creating areas of dense scrub and woodland features around the perimeter of the Main Site and forming new screening / roadside planting along Highways Works areas. The proposed structural planting will create new habitat links and reinforce existing habitat within the CTA including Ardley Cutting and Quarry SSSI and other LWSs and DWSs adjacent to the site, improving semi-natural habitat connectivity to habitat beyond the site boundary.

- 6.5.6. The surface water management system will include a Sustainable Drainage System (SuDS) to minimise surface water runoff and associated pollution of watercourses and groundwater.
- 6.5.7. The measures outlined above are integral to the design of the Proposed Development. The assessments of likely effects on ecological receptors detailed below take into account this 'embedded' mitigation within the proposals, together with those measures such as protected species licences that can realistically be expected to be applied as a result of legislative requirements.

Lighting

- 6.5.8. The draft Lighting chapter includes a high-level lighting strategy which has regard to ecological standards and requirements⁴⁰. This describes appropriate positioning and orientating of luminaires and the use of shields or cowls to ensure that any artificial lighting of potentially sensitive ecological receptors during the operational phase is negligible and within the range of natural moonlight (<0.4lux).

Biodiversity Net Gain

- 6.5.9. A Biodiversity Impact Assessment based on Defra 3.0 has been carried out based on the Parameters Plan and Illustrative Masterplan and though based on a variety of assumptions demonstrates that the scheme is capable of delivering a >10% net gain in biodiversity.

Construction Phase

- 6.5.10. The following section identifies potential or likely effects in the absence of any mitigation. In reality, there will be measures taken to reduce or eliminate effects on ecology and habitats during the construction phase, and these are set out below (see Section 6.6).

³⁹ The illustrative details include approx. 132ha (around 45% of the total area) within the Main Site as structural Green Infrastructure and Landscaping.

⁴⁰ Bat Conservation Trust & Institute of Lighting Professionals (ILP) 2018. *Guidance Note 8: Bats and artificial lighting in the UK*. Bats and the Built Environment Series..

International Statutory Designated Sites of Nature Conservation Interest

- 6.5.11. Oxford Meadows SAC is an Internationally important site located c.13.6km to the south of the Proposed Development (Figure 1b within **Appendix 6.1**), therefore there will be no direct loss of habitats from the SAC as a result of the development.
- 6.5.12. The Proposed Development lies outside of the IRZs identified for the four constituent SSSIs encompassed by the Oxford Meadows SAC: Cassington Meadow SSSI, Yarnton and Pixey Meads SSSI, Wolvercote Meadow SSSI and Port Meadow SSSI. IRZs reflect the particular sensitivities of individual SSSIs in conjunction with any corresponding European site underpinned by the SSSI designation and provide a rapid risk assessment that considers whether a proposed development is likely to affect a SSSI.
- 6.5.13. Given the intervening distance between the Proposed Development and the Oxford Meadows SAC IRZ, the only potential pathway by which the construction phase could adversely affect the integrity of the SAC is via an impact on air quality acting on the SAC (refer to Air Quality Chapter 4).
- 6.5.14. *This section will consider possible indirect effects on statutory sites / non-statutory sites due to fragmentation. The detail will form part of the next version of this Chapter.*

National Statutory Designated Sites of Nature Conservation Interest

- 6.5.15. Construction of the rail cuttings and sidings connecting to the Chiltern Main railway line and the bridge to take the Ardley Bypass over the railway line will result in some localised loss of habitat from within the boundary of the Ardley Cutting and Quarry SSSI. This will necessitate the removal of c.1.36ha of SSSI habitat (c.11% of the total designation) and the temporary disturbance of an additional c.1.46ha). Furthermore there is potential for the SSSI to be subject to adverse construction effects due to dust, pollution and noise (farm birds), the impact of which is in the process of being assessed. In the absence of mitigation the Proposed Development therefore has potential to result in a permanent effect of **Major adverse** significance on a nationally important receptor.
- 6.5.16. The Ardley Cutting and Quarry SSSI is also designated for its geological interest, therefore reference should be made to Chapter 10 which considers potential impacts on geological features, including the Ardley Cutting and Quarry SSSI.
- 6.5.17. There will be no direct loss of habitat from any other statutorily designated sites (European Sites, SSSIs or LNRs) as a result of the development. The magnitude of the distance separating the Proposed Development from all other statutory sites of nature conservation interest is considered sufficient to ameliorate the risk of any indirect impacts to such sites during construction.

Non-Statutory Sites of Nature Conservation Value

- 6.5.18. The following section considers the potential construction impacts upon non-statutory designated sites of nature conservation interest as a result of the Proposed Development. The potential construction impacts to these non-statutory sites include those occurring as a result of the following factors:
- Habitat loss;
 - Physical damage to retained vegetation and soils; and
 - Accidental pollution events;
 - Dust deposition
- 6.5.19. The following non-statutory sites are located within, or partially within 1km of the Proposed Development (see Figure 1a within **Appendix 6.1**):
- Upper Heyford Airfield LWS
 - Ardley Fields Quarry LWS
 - Ardley Fields Ponds East LWS
 - Ardley Fields Ponds East LWS
 - The Heath pDWS
 - Trackway adjacent to The Gorse pDWS
 - Kennel Copse pDWS
 - Ardley Road Verge Nature Reserve DWS
 - Ardley and Upper Heyford CTA
 - Trow Pool LWS
 - Stoke Wood LWS
 - Tusmore and Shelswell Park CTA
- 6.5.20. There will be some localised habitat losses from within the boundaries of the Ardley and Upper Heyford CTA, Ardley Fields Quarry LWS, and Ardley Road Verge Nature Reserve DWS as a direct result of the Proposed Development (Figure 1a within **Appendix 6.1**). Furthermore given the close proximity of the remainder of these three sites, without appropriate mitigation there is potential during construction for physical damage to retained vegetation, in particular the root systems of trees, and the compaction of soils, for accidental pollution events and for impacts brought about due to dust deposition. Physical damage to vegetation, and soils can lead to direct mortality or alter the species and structural diversity of vegetation. Additionally there is potential for impacts due to noise disturbance on farmland birds associated with Ardley Fields Quarry LWS.

- 6.5.21. There will be some small-scale habitat loss from Ardley Road Verge Nature Reserve District Wildlife Site (DWS) that results from the routing of a footpath / cycle path along a defunct pull-in road off the B430, representing c.30% of the total area of this site but mostly comprising broken hardstanding. As such the habitat losses would be localised and low magnitude and will not undermine the conservation status of the Ardley Road Verge Nature Reserve DWS, resulting in a permanent **Minor (non-significant) adverse** effect at a local scale.
- 6.5.22. There will be no direct habitat loss from the Upper Heyford Airfield LWS, The Heath pDWS, or Trackway adjacent to The Gorse pDWS. Given the location of these sites immediately adjacent the Proposed Development however there is potential for indirect impacts including physical damage to retained vegetation and soils and accidental pollution events. In the absence of mitigation the proposals therefore have potential to result in short- to medium term significant adverse effects at a local (pDWS) to County (LWS) scale.
- 6.5.23. The remaining neighbouring designated sites of ecological value, comprising Ardley Fields Ponds East LWS, Ardley Fields Ponds West LWS, Kennel Copse pDWS, Trow Pool LWS, Stoke Wood LWS and Tusmore and Shelswell Park CTA lie sufficiently distant from the Proposed Development that no risk of direct physical damage to retained vegetation and soils. However, without appropriate mitigation there is potential for accidental pollution events to impact Ardley Fields Ponds East LWS given its close proximity to the development, albeit being located to the opposite side of the B430. Furthermore there is potential for the accidental pollution of the Tusmore and Shelswell Park CTA as an upper tributary of the Padbury Brook flows from the Proposed Development through this CTA. The relevant section of the CTA supports parkland and Lowland Mixed Deciduous Woodland. Any event during construction that increases the silt or nutrient load of the watercourse have the potential to impact on downstream ecological features. The consequences of these pollution events can affect habitat structure and function, which may then affect dependant faunal species. In the absence of mitigation it is considered likely that accidental pollution could result in short- to medium-term effects of up to **Major adverse significance** to the aquatic habitats supported by the Ardley Fields Ponds East LWS, and up to **Moderate adverse** significance to the Tusmore and Shelswell Park CTA.
- 6.5.24. Unmitigated increase in airborne dust, particularly during periods of dry weather, can damage vegetation and potentially affect associated fauna. Where severe, some species may disperse from affected areas in the short-term. The zone of influence that might be reasonably assumed to lead to these ecological effects is typically 100m from the area of construction. The Upper Heyford Airfield LWS, Ardley Fields Quarry LWS, Ardley Fields Ponds West LWS, The Heath pDWS, Trackway adjacent to The Gorse pDWS, Ardley Road Verge Nature Reserve DWS and the Ardley and Upper Heyford CTA fall partly or entirely within the 100m potential ecological zone of influence from increased dust emissions.

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- 6.5.25. *This section will consider potential air quality impacts and will cross reference to the Air Quality Chapter. The detail will form part of the next version of this Chapter.*

Other Sites

- 6.5.26. The magnitude of the distance separating the site from all other non-statutory sites is considered sufficient to ensure that there will be no impacts to these features during construction.

Habitats

Direct Habitat Loss

- 6.5.27. Direct impacts involving habitat losses to accommodate the Proposed Development are anticipated as identified below.
- 6.5.28. Loss of habitats such as arable, tall ruderal vegetation, mixed plantation, improved and species poor semi-improved grassland, which are of limited nature conservation value, will be compensated for through the embedded mitigation that provides a strong green infrastructure package as part of the design. As such, these losses will result in an overall **Negligible** effect on habitat biodiversity following mitigation.
- 6.5.29. Loss of semi-natural woodland from within the Main Site is attributed to significant required ground works and level changes to enable viable built platforms and to facilitate access and small areas of loss on the scale of the whole scheme is considered to have a Negligible Effect on the overall resource given the tree planting proposed as part of the embedded mitigation. Likewise, approximately 93 individual trees are to be removed which is a small proportion of the whole resource within the site and none proposed to be lost are veteran or LWS status so replanting as part of the embedded mitigation will contribute to their replacement such that their loss after mitigation is considered to be a **Negligible** effect on the overall resource. The scheme has been designed to retain larger areas of existing tree cover such as that around the Ashgrove farmstead, mature linear trees (T147-T157) and internal tree groups within areas of open space and green corridors.
- 6.5.30. Direct loss of limestone grassland from the Ardley Cutting and Quarry SSSI from excavated areas, from the construction zone within adjacent areas, and as a result of shading from the new bridge across the SSSI. In the absence of mitigation permanent and temporary **Major adverse** effects are anticipated on this national level receptor and its specific associated invertebrate assemblage.
- 6.5.31. Direct loss of woodland habitat from the Ardley Cutting and Quarry SSSI. This habitat is included within the SSSI citation therefore is given national level status. A permanent **significant adverse** effect is anticipated.

- 6.5.32. Approximately 14.7km of hedgerow is to be removed to enable the highway works. Unmitigated hedgerow loss will result in a reduction in overall habitat connectivity through the site and linking to the wider landscape, a potential permanent **Moderate adverse** effect.
- 6.5.33. Two ditches that receive flows from the neighbouring airfield and that form part of the upper reaches of Ashgrove Brook will be realigned to avoid the built development. The realigned sections will have open channels with the exception of any necessary culverts beneath access roads or the main highway. In the absence of targeted mitigation the realignment and partial culverting of these ditches could result in a **significant adverse** effect to these and to downstream habitats due to the change in character. No changes are proposed to the main reach of Ashgrove Brook through the centre of the Main Site.

Indirect Impacts

- 6.5.34. Indirect effects on habitats arise from the potential for disturbance to existing habitats as a result of the Proposed Development. These include: accidental pollution, dust deposition, and physical damage of retained vegetation.
- 6.5.35. Accidental pollution events may result in localised damage or destruction of vegetation or more diffuse effects through spillages into wetland features and habitats downstream. In the absence of mitigation this has the potential to lead to short-term localised effects of a low magnitude, resulting in a **Moderate adverse** effect.
- 6.5.36. Dust deposition can affect the ability of plants to photosynthesise. Retained habitats that fall within the potential zone of influence of dust deposition from the Proposed Development include woodland, hedgerows, grasslands and ponds. The potential impact to woodlands and hedgerows is likely to be reduced by the retardation of dust by the canopy and shrubs, and therefore any effect to these features localised to the source of dust emissions. Dust impacts on wetland habitats and the resulting alteration in nutrient status is unlikely to affect their status, given that they are already likely to be highly modified as a result of adjacent agricultural land uses. Overall, potential effects of dust have the potential to result in a temporary and non-consistent (wind direction will strongly influence deposition and rain events will wash the dust from plants) **Minor (non-significant) adverse** effect on retained and neighbouring habitats generally, and up to a **Major adverse** effect on Nationally significant priority habitats within the SSSI.
- 6.5.37. *This section will consider potential nutrient enrichment of the SSSI habitats. The detail will form part of the next version of this Chapter.*
- 6.5.38. In the absence of appropriate mitigation construction operations could result in inadvertent damage, such as soil compaction and disturbance, to the retained vegetation and soils of ecologically valuable habitats including woodland, grassland

and hedgerows. Any such damage, which can undermine the long-term viability of these habitats, has the potential to result in a **significant adverse** effect.

Fauna - Impact of Habitat Loss, Fragmentation & Disturbance

Badger

- 6.5.39. Construction impacts to badgers as a result of the Proposed Development will include the loss and disturbance of setts and the loss of foraging habitat.
- 6.5.40. In the absence of mitigation, the loss and disturbance of setts as a result of the Proposed Development may result in an adverse effect of high magnitude leading to the loss of a significant proportion of setts from the badger social group leading to the potential for its loss and in the absence of mitigation a **Major adverse** effect on the species at a local scale.
- 6.5.41. The loss of the seasonal foraging resource, i.e. arable fields, within the Main Site is likely to result in the loss of a significant proportion of the badger foraging resource and result in a permanent **Moderate adverse** effect. The localised loss of foraging habitat from the Highways Works areas will result in a permanent **Minor (non-significant) adverse** effect at a local scale.

Bats

Bat Roosts

- 6.5.42. The renovation of retained buildings associated with Ashgrove Farm and Ashgrove Cottages has potential to result in the loss of confirmed roosts within building section B1a (occasional day roost used by small numbers of non-breeding common pipistrelle) and B1d (a brown long-eared bat feeding roost and occasional (non-breeding) pipistrelle roost). Furthermore works to buildings B5 and B10 have potential to disturb or destroy features that have previously supported roosting bats (most likely occasional day roost used by individual or low numbers of non-breeding brown long-eared bats and pipistrelle) and which have high potential to support bats at the time of works.
- 6.5.43. There is a risk that in the absence of mitigation the loss or modification of confirmed roosts or buildings with high potential to support bats may result in harm to any bat that may be present at the time of works. Given the occasional use by low numbers of non-breeding pipistrelle and/or brown long-eared bats the effect of any increased mortality or disturbance would be low magnitude and would result in no more than a **Minor (non-significant) adverse** effect at a local scale.

- 6.5.44. A small number of trees (9 to 12) with potential to support bats will be lost as a result of the Proposed Development. Targeted survey of these via aerial survey with canopy access and/or nocturnal survey however recorded no evidence of use by roosting bats. It is therefore considered likely that at most these support roosting bats on no more than an occasional basis, as part of a network of several such roost sites. In the absence of specific mitigation this loss would result in a low magnitude effect to local bat species and is unlikely to affect the viability of status of bat populations locally. In this context, the permanent loss of potential occasionally used tree roosts is considered to be a **Minor (non-significant) adverse** effect at a local scale.

Bat Foraging & Commuting Habitat

Habitat Loss

- 6.5.45. The Proposed Development will result in the partial removal of existing habitats from within the site that are regularly used by the local bat populations for foraging and commuting purposes. Losses include the majority of existing habitat corridors from the interior of the Main Site. The Highways Works will additionally result in some localised habitat removal, most notably of established hedgerows and trees.
- 6.5.46. The magnitude of the impact on foraging and commuting bats resulting from habitat removal would be tempered by the wide availability of similar, suitable foraging habitat in the surrounding area, and furthermore by the provision of embedded mitigation in the form of the proposed buffer planting around the main site perimeter and along both the B430 Ardley Bypass and Middleton Stoney Relief Road. As such the magnitude of the impact on foraging and commuting bats following habitat removal is considered to be low, resulting in a **Minor (non-significant) adverse** effect on foraging and commuting bats at a local level.

Habitat Fragmentation

- 6.5.47. The severance of linear features used by commuting and foraging bats can hinder their access to favoured foraging areas and/or to roosts, resulting in fragmentation impacts. The removal of hedgerows and trees from the interior of the Main Site will limit available options for bats commuting between areas of retained habitat. The retention and enhancement of boundary features around the Main Site is however considered sufficient to maintain the function of connections between areas of off-site habitat for all bat species present.
- 6.5.48. The highways works will permanently sever a number of habitat corridors within the local landscape that are used by foraging and commuting bats, notably hedgerows and the woodland belt along Gagle Brook. Of these the most sensitive feature is likely to be the Gagle Brook corridor which forms a strong linear feature used regularly by at least seven bat species, with the most frequently recorded species being common pipistrelle (75.2% of registrations in summer (July), and 51.8% in autumn

(September), and soprano pipistrelle (9.6% in summer, 34.5% in September). The remaining species comprising noctule/*Nyctalus* sp., *Myotis* sp., brown long-eared bat, barbastelle, and serotine were recorded far less frequently, though with the exception of serotine were confirmed present in both summer and autumn.

- 6.5.49. The fragmentation of existing habitats has the potential to hinder the ability of local bat colonies to continue to access foraging and commuting habitats. The effect of habitat fragmentation can be further exacerbated by the deterrence of bats by associated road lighting or by the requirement of specific construction works for night-time lighting for security reasons. The overall magnitude of this impact however is likely to be limited by the availability of alternative foraging habitat in the surrounding area and the embedded soft landscaping that will include perimeter planting as outlined above and the creation of continuous tree and shrub corridors along the entire western verge of the bypass and relief road.
- 6.5.50. In the absence of mitigation it is considered likely that habitat fragmentation would result in an impact of up to **Moderate adverse** significance at a local scale.

Great Crested Newts

- 6.5.51. No GCN breeding ponds will be lost as a result of the Proposed Development.
- 6.5.52. There are however four GCN metapopulations using ponds that surround the Main Site and at least one metapopulation using ponds within and surrounding the Highways Works. Onsite terrestrial habitats (hedgerows, scrub, woodland and taller grassland habitats) provide potential cover and foraging opportunities for GCN and other amphibians during their terrestrial phase. Unmitigated the proposals have potential to impact upon all four metapopulations including disturbance, killing and injury of individuals during site clearance, which would potentially result in a **Moderate adverse** effect on the local population.

Reptiles – Main Site

- 6.5.53. Construction within the Main Site will result in small losses from the existing railway embankment, which provides areas of suitable reptile habitat. Based upon the locations of common lizard which were concentrated along the northern boundary adjacent to the railway it is reasonable to anticipate that these areas will also support populations of common lizard. Given that the habitat losses are highly localised leading to effects of low magnitude it is unlikely that they will affect the conservation status of any wider population that may be present and therefore considered to result in an effect of **Negligible** significance.
- 6.5.54. Grass snake and slow worm which have also been recorded within the Main Site, are a wide-ranging species that are likely to make use of a variety of habitats within the surrounding landscape. Consequently, habitat losses during construction are

therefore unlikely to significantly affect the habitat that is available to the local grass snake population and any effect is considered to be of **Negligible** significance.

- 6.5.55. In the absence of any mitigation, the site clearance operations are likely to result in an increased incidence of mortality in any reptiles that are present through accidental killing or injury leading to a reduction of range and effects of a low magnitude. An increase in mortality of any reptiles that maybe present is likely to result in a **Minor (non-significant) adverse** effect on reptile species locally.

Birds

Habitat Loss

Breeding Birds – Main Site

- 6.5.56. The loss of all arable habitat and pasture fields from the Main Site as a result of the construction process will lead to the loss of the recorded farmland bird assemblage. This includes the locally important linnet, corn bunting, yellowhammer, skylark and stock dove which depend on these habitats for nesting and/or foraging. It is therefore considered that the construction phase of the Proposed Development will result in a permanent **Minor (non-significant) adverse** effect locally on the breeding farmland species recorded present.
- 6.5.57. For the generalist species which largely inhabit the hedgerow network and woodland, including the locally important song thrush, mistle thrush and dunnock, habitat loss during the construction phase will result in a short- to medium-term local adverse effect on these species, however as the shrub and tree planting provided as part of the embedded mitigation matures this will result in a local **Negligible to Minor positive** effect.
- 6.5.58. The loss of some buildings on site and renovation of the remainder will in the absence of specific mitigation result in an adverse effect on the species which utilise these structures for nesting. These include the locally important barn owl, house sparrow and kestrel, which will also be impacted by the loss of grassland and field margins for foraging resulting in a permanent **Minor (non-significant) adverse** effect on these species at a local level.

Breeding Birds - Highway Works Areas

- 6.5.59. A full assessment of the impacts on birds within the Highway Works will be provided in the final ES Chapter once all surveys are completed.
- 6.5.60. The proposed Highway Works will result in the loss of arable habitats and hedgerow sections from along the route of the proposed highways and to each side of the new roads to facilitate road construction. Habitats outside of but immediately adjacent to

the highways footprint will form part of the site green infrastructure and will link to off-site retained arable fields and hedgerows.

Wintering Birds – Main Site

- 6.5.61. It is anticipated that the loss of the arable and pasture fields will have a County Level impact on yellowhammer and skylark, which currently overwinter within the Main Site in county important numbers. Skylark is a transitory species during winter, using a network of foraging habitats, and the Main Site likely forms only a portion of the winter foraging habitat for the recorded skylark population. The effect on skylark and yellowhammer would be of **Moderate adverse** significance.
- 6.5.62. The proposals will lead to a **Minor (non-significant) adverse** effect at a local level on the other farmland specialists and generalists recorded, including grey partridge, starling, fieldfare, redwing, lesser black-backed gull, stock dove and barn owl. The demolition of some of the farm buildings and renovation of the remainder will furthermore remove probable barn owl roosting sites (see **Appendix 6.5**). It is anticipated the impact on peregrine and merlin will be **Negligible** since these species cover large territories in winter and there is an abundance of further suitable arable and grassland habitats in the wider landscape. In addition, peregrine can adapt successfully to urban habitats.
- 6.5.63. For the generalist species which inhabit the hedgerows, trees and woodland, including the locally important song thrush, bullfinch and dunnock, the development will likely result in a short to medium-term local adverse effect due to habitat loss during the construction phase, however as the shrub and tree planting provided as part of the embedded mitigation matures this will result in a **Negligible to Minor positive** effect at a local level.

Wintering Birds - Highway Works Areas

- 6.5.64. The loss of arable habitat from within the Highway Works areas and associated habitat fragmentation will likely result in a **Moderate adverse** effect on the County level wintering farmland bird species skylark, yellowhammer, and corn bunting, and a **Minor (non-significant) adverse** effect on wintering grey partridge (see **Appendix 6.6**).
- 6.5.65. Given the inclusion of substantial native species shrub and tree planting as part of the proposals it is considered that other wintering bird species that utilise the Highway Works areas will undergo a short-term local adverse effect due to habitat loss and disruption during the construction phase, however as the soft landscaping matures this will result in a **Negligible to Minor positive** effect locally.

Disturbance to Birds During Construction

- 6.5.66. Construction activities have the potential to cause disturbance to breeding birds, which if unmitigated may lead to the destruction of nests. Noise from vegetation clearance, ground works and other activities of low frequency but high amplitude may also cause disturbance which may lead to reduced breeding success or even nest desertion. The application site supports bird assemblages typical of the habitats present within the site, therefore it is considered that construction activities will result in a temporary **Minor (non-significant) adverse** effect on bird assemblages at a local scale.
- 6.5.67. Under the proposals the woodland in which the spotted flycatcher pairs were recorded lies outside of the Proposed Development and is to be retained. Impacts from the construction process including noise and increased disturbance are however likely to result in a temporarily **Minor (non-significant) adverse** effect on this species at a County Level.

Riverine Mammals

Main Site

- 6.5.68. The proposals include the construction of a road over relatively short sections of Ashgrove Brook. Based on evidence to date, water vole and otter are presumed to be non-resident within the Main Site, however, there remains potential for Ashgrove Brook to be used on occasion by otter as foraging habitat during periods of increased rainfall. Due to the wide-ranging nature of this species and the limited suitability of these watercourses, overall it is considered that development of the Main Site will have a **Negligible** effect on otter and water vole.

Highway Works

- 6.5.69. The development of the Highway Works Area will lead to the removal of existing riverine and temporary disturbance of a short stretch of the Gagle Brook to facilitate the construction of a road and associated earthworks. Furthermore, potential pollution events resulting from construction activities have the potential to impact riparian mammal populations that may be present locally, as well as populations downstream. Otters are wide-ranging and mostly active outside of the normal daily construction period, therefore this temporary disturbance is considered unlikely to materially affect the conservation status of this species, should it be present locally. The effect of construction upon otter is therefore considered to be of **Negligible** significance.
- 6.5.70. Given the lack of suitable water vole habitat within the Highway Works areas and the absence of any field signs it is considered that such habitats do not support this species. Construction would therefore result in a **Negligible** effect on water vole.

Invertebrates

- 6.5.71. The majority of habitat lost to development comprises intensively managed arable fields considered to represent poor habitat for invertebrates. Clearance of the site will remove some features that represent suitable habitat for the local invertebrate assemblage, including loss of unimproved calcareous and neutral grassland from within the SSSI and the removal of the majority of the hedgerows, deadwood associated with mature trees and grassland habitat from within the Main Site, including road verges. In the absence of mitigation the removal of these features would lead to a reduction in the total resource of suitable habitat that is available to the invertebrate population. Although deadwood habitats such as that associated with mature trees may occur infrequently at a local level it is likely to be widespread as hedgerows and similar woodland or scrub habitats are reasonably abundant within the surrounding landscape, therefore the magnitude of loss is considered low. In the absence of mitigation the loss of invertebrate habitat as a result of the Proposed Development is likely to result in a short-term effect at a local scale of no more than **Minor (non-significant) adverse** significance.

Operational Phase

Statutory Sites of Nature Conservation Value

- 6.5.72. By the time the site is operational the Ardley Cutting and Quarry Site SSSI will be fenced off and management of its habitats returned to the jurisdiction of Network Rail. Potential impacts to this and other statutory sites would therefore relate only to potential indirect impacts such as those resulting from nitrogen deposition from increased traffic.
- 6.5.73. The remainder of this section will consider potential air quality and hydrological pathways and will reference the Air Quality and Hydrology chapters as required. The detail will form part of the next version of this Chapter.

Non-Statutory Sites of Nature Conservation Value

- 6.5.74. The potential operational impacts to non-statutory sites as a result of the Proposed Development include those occurring as a result of changes to air quality, local hydrology, and recreational pressure.
- 6.5.75. Trampling of vegetation and the compaction of soil as a result of increased visitor pressure can lead to the degradation of habitats. Notable effects include alterations in the diversity of plant communities and vegetation structure and also reduced survival rates of the species that depend upon these habitats. Ardley Road Verge Nature Reserve falls within the boundary of the Main Site and it is reasonable to expect that in the absence of mitigation it would be subject to an increase in recreational activity due to access by SRFI personnel. In the absence of mitigation this may result in a reduction in the extent of existing ground flora, including meadow

clary, which has the potential to result in a long-term or permanent **Moderate adverse** effect.

- 6.5.76. *The remainder of this section will consider potential air quality and hydrological pathways and will reference the Air Quality and Water/Drainage chapters as required. The detail will form part of the next version of this Chapter.*

Habitats

- 6.5.77. Following construction, the retained vegetation, including woodland, hedgerows and trees, may be adversely impacted by an increase of human presence and any associated recreational activities, though given the non-residential nature of the development, the magnitude of any such increase would be relatively small. Without mitigation it is expected that these effects would primarily be associated with formal footpaths or informal desire lines, and therefore highly localised. The small postconstruction increase in visitor pressure upon the woodland, hedgerows and trees is likely to be localised and low magnitude, resulting in no more than a **Minor (non-significant)** effect at a local scale.
- 6.5.78. Without the application of appropriate mitigation, uncontrol access and vandalism may result in a reduction of the life span of the trees. Any such reduction in life span would result in long term **Moderate adverse** effects to the veteran trees.
- 6.5.79. Without an appropriate drainage strategy, uncontrolled runoff could result in increased pollution of the watercourses present within the site. Such uncontrolled pollution is likely to affect the functioning of the existing watercourse and affect downstream receptors which could result in a long term impacts of moderate magnitude and up to **Moderate adverse** significance within the catchment.
- 6.5.80. Implementation of long-term, sympathetic management of retained and newly created hedgerows and woodland within Main Site and Highway Work areas will represent a **Minor positive** effect at a local scale.
- 6.5.81. Retained grassland will form part of the Proposed Development green infrastructure and will be placed into long-term sympathetic management along with newly created ‘wildflower grassland’ and is considered to represent a **Minor positive** effect at a local scale.

Fauna

- 6.5.82. The following considers the likely operational impacts of the Proposed Development upon faunal species.

Badger

- 6.5.83. The layout of the Main Site and Highway Works will introduce potential barriers to movement of badgers, such as roads and industrial areas, which may limit their access to available habitat both within the Main Site and the surrounding areas, and

also within the Highway Works areas. The retention of boundary features will continue to maintain some suitable corridors of movement for badgers, however there is potential for disturbance associated with the operation of the site to fragment the resident badger populations. In the absence of mitigation habitat fragmentation is therefore likely to result in a permanent **Minor (non-significant) adverse** effect at a local scale.

- 6.5.84. The new roads serving the Main Site, improvements to Junction 10 of the M40, the Ardley Bypass and Middleton Stoney Relief Road will likely lead to increased levels of badger mortality due to road traffic collision. An increase in badger mortality rates may affect the integrity of the badger population through lowered survival rates, limitations to dispersal or a reduced breeding success, though in high quality habitats badger populations are often able to maintain their status despite relatively high levels of mortality. The magnitude of any potential impact is likely to be limited by the existing badger populations habituation to the M40, G430, Ardley Road and Camp Road and as such is considered to be low. Any impact from increased mortality due to road traffic will therefore at most result in a long-term **Minor (non-significant) adverse** effect locally.

Bats

Mortality

- 6.5.85. The severance of flight lines by new roads could result in an increased risk of bats being killed by road traffic, both along internal roads within the Main Site and the new bypass and relief roads.
- 6.5.86. Vehicle speeds will be limited within the Main Site to below 40 mph. Furthermore, the most significant road crossing of a habitat corridor occurs at the location of the roundabout to the south where vehicles will be moving even more slowly.
- 6.5.87. The Ardley Bypass road will cross over the off-site Chiltern Main Line and associated vegetated embankments and the relief road will sever the Gagle Brook corridor, both features providing strong linear features and suitable foraging and commuting habitat corridors for local bat species. There is therefore a reasonable risk of an increased mortality to bats as a result of vehicle collisions.
- 6.5.88. The magnitude of any impact is likely to be low as a result of either the adaptable nature of the species that were most frequently recorded along the brook and other locations surveyed, i.e. common pipistrelle, soprano pipistrelle and noctule, and the lower frequency of use by other more wide-ranging species, such as barbastelle. It is considered that in the absence of mitigation any effect to any bat species as a result of vehicle collisions will be a permanent **Minor (non-significant) adverse** effect at a local level.

Great Crested Newts

- 6.5.89. Without mitigation the increased activity associated with operation of the Proposed Development and the provision of features, such as raised kerbs and drainage gulley pots, have the potential to increase the incidence of GCN mortality, i.e. as individuals become trapped in the gullies (English Nature 2001). This has the potential to adversely affect the integrity of the GCN newt population through a gradual reduction in adult numbers. Due to the presence of two 'Exceptional' populations and one 'Good' population in proximity to the Main Site, and a potential additional metapopulation within the northern Highway Works area the effect could lead to a gradual reduction on population size and a **Moderate adverse** effect.

Reptiles

- 6.5.90. The enhancement of the watercourse had the potential to complement the existing riparian habitat for grass snake if managed appropriately, however conversely if management of the banks and watercourses is increased to a degree that reduces the shelter and foraging opportunities for reptiles, this would inhibit potential movement of reptiles along this corridor.
- 6.5.91. Overall, the green infrastructure component of the operational development will include extensive areas of connective habitat for common lizard and grass snake; features such as woodland edge, hedgerows, scrub and sunny banks. This will provide suitable conditions for these species to expand their range and population size to areas further south, resulting in a **Minor positive** effect at a local scale. However, the potential barriers to dispersal for GCN would be the same for common lizard, grass snake and slow worm. This would be a restriction to the potential extent of enhancement for the existing population and would not alter the current conservation status of that population; therefore, the effect would be **Minor (non-significant) adverse** at a local scale.

Birds

Main Site

- 6.5.92. The operational development will, in the absence of mitigation lead to an increase in disturbance to birds due to the proximity of development to retained habitats, as well as the increase in noise and light disturbance resulting from the operation of the Rail Freight Interchange. In the absence of mitigation this is likely to lead to the loss of kestrel and barn owl, resulting in a **Minor (non-significant) adverse** effect on these species locally. The status of the remaining bird assemblage that make use of the hedgerow and tree habitats scheduled for retention operational impacts is anticipated to remain largely unchanged from that during construction, considered a **Negligible** effect.

- 6.5.93. The retention of the large pond will result in a **Negligible** effect on the assemblage of birds recorded in association with this habitat, albeit there could be some temporary noise disturbance during construction on neighbouring habitats. Whilst two smaller waterbodies will be lost from the site as part of the development, no wetland species were recorded utilising these features.

Highway Works

- 6.5.94. The Highway Works area will be permanently impacted by an increase in road traffic due to the construction of the Ardley Bypass and Middleton Stoney Relief Road and associated road infrastructure. Proximity to roads is known to effect breeding bird density. Whilst it is not certain how various factors contribute to this effect, noise is one contributory factor. The influence of noise disturbance on birds is poorly understood, but Rajneen *et al*⁴¹ have provided a threshold-based model by studying the effects on bird populations in The Netherlands. Based on the anticipated traffic load and vehicle speeds along the proposed Ardley Bypass and the Middleton Stoney Relief Road and the open nature of the surrounding habitats it is anticipated that bird populations may experience a reduced density at a distance of up to 125m from the road. This disturbance effect is however unlikely to alter the assemblage of breeding birds. It is considered that the overall abundance of each notable breeding bird species will be reduced, resulting in a permanent **Minor (non-significant) adverse** effect at a Local level.
- 6.5.95. Similarly, the proposed road improvements and new road infrastructure will result in a permanent disturbance to wintering birds using the Highway Works area. The farmland bird species recorded, such as skylark, yellowhammer, linnet and corn bunting, are more transitory in winter, and although the completed scheme will provide some areas of suitable habitat, the areas closest to the proposed roads will likely not be used by the recorded wintering farmland specialists. The magnitude of any adverse impact will be lessened due to the amount of suitable winter foraging habitat available within the local area. It is therefore considered that operational effects on wintering birds within the Highway Works area will result in **Minor (non-significant) adverse** effects at a local scale.

Riverine Fauna

Otter

- 6.5.96. The bridged sections of Ashgrove Brook and those sections nearest the new roads will be subject to regular noise disturbance from traffic. In addition, should otters utilise this brook section on occasion there would be an increased risk of mortality of otters due to traffic related incidents. At a UK level, the impact of road collisions is

⁴¹ Reijnen, R., Foppen, R., and Veenbaas, G. 1997. Disturbance by traffic of breeding birds: evaluation of the effect and consideration in planning and managing road corridors. *Biodiversity and Conservation* 6 :567-781.

not thought to have significantly affected the status of otters, particularly given this species more recent increase in abundance⁴². As otters are considered unlikely to use the brook other than on a very occasional basis however, operational effects on this species within the Main Site are considered to be **Negligible**.

- 6.5.97. Once operational there is potential for otters, if present locally, to cross the newly constructed roads and therefore be subject to occasional mortality of individuals. Similar to above, given the absence of otter sign and presumed use of the brook by this species being occasional at most, it is considered that operational effects upon otter resulting from the road construction works will be **Negligible**.

Invertebrates

- 6.5.98. The main potential impacts for this group are changes in management / disturbance of retained habitats. Runoff from roads has the potential to pollute and this is particularly pertinent to invertebrates due to the sensitivity of this group to such impacts.
- 6.5.99. *The remainder of this section will be expanded as the assessment progresses. The detail will form part of the next version of this Chapter.*

⁴² Grogan, A., Green, R. & Rushton, S. 2013. *The Impacts of Roads on Eurasian Otter (Lutra lutra)*. IUCN Otter Spec. Group Bull. 30 (1) pp 44 – 57.

6.6. MITIGATION AND RESIDUAL EFFECTS

Additional Mitigation

- 6.6.1 The development proposals are described in draft Chapter 2 of this ES. This draft/preliminary section describes the emerging mitigation and compensation measures that will additionally be proposed and implemented, over and above the intrinsic scheme design and embedded mitigation measures. Such additional measures will address and minimise potential adverse ecological effects that have been identified during the EclA process as potentially significant, and/or ensure legal compliance.

Construction Environment Management Plan (CEMP)

- 6.6.2 It is proposed that a CEMP would be secured through an appropriately worded 'requirement' if a Development Consent Order is granted. The contents of this document would adhere to and, where necessary, provide further detail on the recommendations outlined below for designated sites, habitats and fauna to ensure best working practices are adopted during the construction phase. In brief, the CEMP will identify specific areas for the protection of ecological features and provide details of avoidance and mitigation measures as appropriate, including the requirement that any lighting used meets current industry guidance⁴³. Given the time required to deliver the Proposed Development it is anticipated that, where necessary, the CEMP will be informed by updated ecological surveys that are relevant to any particular phase of development. The CEMP will apply the most recent ecological baseline to inform mitigation, the appropriate location and timing of works, the responsibilities of site workers, including Ecological Clerk of Works, and the use of barriers or signage.
- 6.6.3 Mitigation measures will be detailed within the CEMP to ensure that all retained habitats, including woodland, the veteran tree and hedgerows, are afforded suitable protection throughout the lifetime of the proposed development, i.e. working methods will adhere to standard best practice guidance. This will include BS5837: 2012, which also applies to hedgerows with trees present.
- 6.6.4 The release of airborne dust particles during construction will be controlled through the use of best practice measures, including, where necessary, the avoidance of work during extended periods of dry weather, damping of dust and wheel washing associated particularly with the intermodal terminal activities.
- 6.6.5 The prevention of accidental spillages entering local watercourses and the appropriate design of site drainage systems will be based upon the recommendations

⁴³ Bat Conservation Trust & Institute of Lighting Professionals (ILP) 2018. *Guidance Note 8: Bats and artificial lighting in the UK*. Bats and the Built Environment Series.

Gazaryan, S. & Meyer-Cords, T. (Eds). 2018. *Guidelines for consideration of bats in lighting projects*.

EUROBATS Publication Series No. 8. Bonn: UNEP/EUROBATS Secretariat.

Bat Conservation Trust 2011. *Statement on the impact and design of artificial light on bats*.

of the Environment Agency's Guidance on Pollution Prevention series. These include measures that will ensure the safe storage of material and that silt generated by construction activities is not released to the existing systems.

6.6.6 Implementation of the proposed sustainable drainage system within the Proposed Development will ensure that the rate and amount of water run-off are unaltered, i.e. not significantly altered above existing greenfield rates. A reduction in water quality of surface run-off is also unlikely due to the implementation of appropriate measures within the SuDS proposals.

Designated Sites of Nature Conservation Value

General Measures

6.6.7 Best practice measures will be adopted during to avoid potential disturbance to non-statutory sites of nature conservation interest, including Ardley Cutting and Quarry Site SSSI. This will include measures secured through the CEMP, including:

- Control of accidental pollution events during construction;
- Control of dust during construction;
- Protection of retained vegetation through the use of stand-offs, including the implementation of BS5837:201244, and
- Sustainable drainage to maintain water run-off at existing greenfield rate and quality.

Specific Measures for Ardley Cutting and Quarry SSSSI

6.6.8 Given the Proposed Development has the potential to impact the Ardley Cutting and Quarry SSSI Natural England has been engaged via their Discretionary Advice Service to determine how impacts are to be minimised and mitigated.

6.6.9 The final details of the mitigation for short-term impacts and permanent loss of SSSI limestone grassland are therefore yet to be confirmed. These are however likely to encompass:

- Minimising habitat loss by keeping construction zones as small as possible;
- Ensure effective fencing to prevent encroachment by construction traffic into areas not being impacted;
- Habitat translocation to suitable receptor sites on-site, with receptor areas exceeding in extent the areas directly lost;

⁴⁴ BS5837: 2012 *Trees in Relation to Construction – Recommendations: 2005 for trees and hedges*.
BSI Standards Publications

- Creation of new calcareous grassland habitat;
 - New native species tree planting and woodland creation, and
 - Appropriate dust suppression during earthworks as delivered through the CEMP.
- 6.6.10 Furthermore the specific long-term management of on-site calcareous grassland will not be hindered by the access issues that restrict the current effectiveness of management of the SSSI grassland areas.

Habitats

Landscape Environment Management Plan

- 6.6.11 The proposed green infrastructure scheme, including the SuDS wetland features and structural planting and meadow grassland, will be entered into a sensitive long-term Landscape Environmental Management Plan (LEMP) to ensure an increase in the overall habitat diversity within the site. By ensuring appropriate management of the retained and created habitats, they will prevail and be capable of supporting a greater range of invertebrate biodiversity which in turn will provide prey for common and widespread fauna including bats, birds and small mammals to enhance foraging and commuting habitat for these groups.

Meadow Clary Translocation Strategy

- 6.6.12 Any meadow clary present within the development footprint will be translocated prior to the commencement of works to within grassland habitat within the site green infrastructure of sufficient size to enable the translocated population to expand. Translocation will be undertaken during late winter or early spring (mid-February to mid-March) but avoiding working in frosty conditions. Meadow clary is a Schedule 8 species therefore a licence from Natural England will be required to enable the translocation works.
- 6.6.13 New plants will additionally be grown from mature seed collected from the existing population. These will be planted out the spring after the second year of growing on into on-site grassland receptor areas to increase the population.
- 6.6.14 The translocated population will be monitored annually for three years to assess establishment of translocated plants and to establish whether there has been any natural population growth as a result of seed shed by the translocated plants.

Fauna

Badger

- 6.6.15 Best practice measures will be adopted to avoid the risk of harm to badgers, secured via a CEMP. During construction this will include precautionary surveys in advance

of site clearance, covering any large pipes, pits or trenches that are left open overnight, or where appropriate providing an adequate means of escape, such as sloping profile or plank. Badger fencing will also be used where necessary to avoid the risk of badgers entering the construction area and to guide individuals towards foraging habitat and commuting routes.

- 6.6.16 Up to date survey information will be fundamental to the success of badger mitigation, as setts can be easily excavated. Work that directly affects an active badger sett or is likely to disturb badgers occupying a sett would be completed under an appropriate Natural England licence that would be informed by a pre-commencement survey. Where appropriate this mitigation will include the provision of a replacement sett as part of the site green infrastructure.
- 6.6.17 The Proposed Development will incorporate badger tunnels and fencing to ensure that connectivity is maintained between retained setts and foraging areas. Their location is dependent on detailed design of the built development and landscape infrastructure.

Bats

- 6.6.18 The renovation of retained buildings associated with Ashgrove Farm will aim to retain confirmed bat roosts and associated access points unmodified within the structures. If however it is determined at the detailed stage that works cannot be undertaken without risking adversely impacting bat roosts, such works would be completed under either a Natural England licence (a European Protected Species Licence (EPSL) or Bat Low Impact Class Licence (BLICL)), with full details of the roost survey data, impacts and mitigation submitted to Natural England for assessment. The licence would detail any timing constraints to works and agreed working practices necessary to ensure that the risk to bats is minimised.
- 6.6.19 Given the low status of the confirmed bat roosts associated with Ashgrove Farm, comprising non-maternity roosts used by small numbers of common and widespread species the mitigation will specify that a pre-works survey is conducted immediately prior to the commencement of works to make certain that roosting bats are not present. Any removal of relevant features will then proceed under the supervision of an appropriately licenced bat worker. Prior to demolition bat boxes will be sited on suitable retained features or mature trees to provide alternative roosting opportunities for local bat populations.
- 6.6.20 The removal of trees with low or moderate bat roost potential will be carried out during the bat active season (May to September inclusive) in accordance with a precautionary method statement in order to ensure legal compliance. The statement will cover the appropriate mitigation measures to ensure that bats are adequately protected during tree works and will include pre-works checking surveys (nocturnal surveys and/or aerial tree climbing inspection). Providing that the checking survey records no evidence of roosting bats each tree will be section felled by experienced

arborists under the supervision of an appropriately licensed bat worker. Cut sections will be left in-situ for a period of at least 24 hours to allow any bats present to disperse.

- 6.6.21 In the event that the checking surveys confirm the presence of roosting bats then works will be halted until an appropriate Natural England derogation licence is put in place. This licence would detail the appropriate timing and safe working practices necessary to ensure that the risk to bats is minimised and that suitable alternative roosting sites are provided in the form of bat boxes erected on suitable trees in the vicinity. The type of bat boxes and location would be determined by the bat worker at that time and would reflect the nature of the roost identified.
- 6.6.22 Suitable bat commuting routes will be maintained through the establishment of native hedgerow, shrub and woodland/tree planting that will maintain continuity with on-site retained vegetation and neighbouring off-site habitats. Where gaps are introduced into linear habitat features ‘hop-overs’ will be created to facilitate the continued, unhindered movement of bats along these features. ‘Hop-overs’ shall consist of a progression of increased canopy heights leading up to heavy standard trees located either on each side of the gap or (for larger breaches) at intervals across the gap to encourage bats (and birds) to naturally increase their flight altitude across the road. Management of mature trees either side of new roads should raise the crown height by regular pruning of lower branches back to the trunk in order to promote the most suitable flight line above the maximum vehicle height, thereby reducing the potential for road traffic mortalities.
- 6.6.23 The above measures are considered appropriate to ensure that the Favourable Conservation Status of local bat populations is maintained throughout construction.

Great Crested Newts

- 6.6.24 Due to the presence of GCN there is a legal requirement to ensure that newts are not harmed or disturbed during development. A strategy will therefore be put in place detailing the mitigation required to safely remove any GCNs that may be present from the working area of the Proposed Development. Licencing and appropriate mitigation will be administered through a European Protected Species Licensing (EPSL).
- 6.6.25 The principles of the emerging (draft) mitigation strategy are:
- trapping out suitable terrestrial habitat and translocating any animals found within 250m of the breeding ponds;
 - where linear habitats such as hedgerows are to be impacted, habitat will be trapped out over 250m to include the entirety of the hedgerow;
 - where trapping is required within the SSSI, due to the sensitivity of the habitats, any fence installation will be done by hand;
 - two receptor areas will be created to the north east of the Main Site to receive translocated GCN from meta populations from the east of the Main Site;

- a third receptor site will be created to the north west of the Main Site to receive GCN from the meta population to the west of the Main Site;
- a forth receptor site will be created in association with the Highways Work in the north to receive GCN from that metapopulation;
- trapping will involve a combination of temporary amphibian fencing and bucket traps are erected around terrestrial habitats where there is a reasonable likelihood that GCNs are present;
- exclusion fencing will be installed at the site perimeters to prevent any GCN from accessing the site during ground works;
- supervised dismantling of all suitable hibernation habitat will be conducted under licence following the completion of trapping;
- design of highways will include measure including tunnels, permanent amphibian fencing, dropped kerbs and/or off-set gully pots to avoid habitat fragmentation and / or individuals becoming trapped in drains: and
- amphibian fencing will be moved back at the earliest opportunity in order that newts are able to safely access any areas of newly created terrestrial habitat.

Reptiles

6.6.26 Measures will be put in place to ensure that reptiles are not harmed during any localised works within suitable reptile habitats. Clearance of such areas will be sensitively managed to discourage reptiles from using any areas of suitable habitat. This will involve the following measures:

- Directional strimming of vegetation towards areas of suitable retained habitat immediately prior to commencement of works;
- Strimming should only be carried out during appropriate weather conditions (i.e. ambient daytime temperatures exceeding 9°C) in the reptile active season (mid-March to mid-October, inclusive); and
- A fingertip search of the working area will be made immediately prior to any ground works to ensure that all common reptiles are absent from the area of work.

Birds

Main Site

6.6.27 To avoid disturbance to breeding birds, ground clearance works, vegetation removal and building demolition will where possible be undertaken outside of the bird-breeding season (i.e. avoiding March to September inclusive). If this timing is not possible, the area will be checked prior to removal of vegetation, ground works or building demolition by an experienced ecologist. If active nests are found, the relevant vegetation or building will be left untouched and suitably buffered from works

until all birds have fledged. Specific advice will be provided prior to undertaking the clearance. This would be a statutory requirement due to the protection of all nesting birds and their nests under the Wildlife and Countryside Act (1981 as amended).

- 6.6.28 The tree and shrub planting throughout the landscape buffer and landscape corridors will compensate for the partial loss of woodland, tree and hedgerow habitat from site by providing alternative nesting and foraging resources for many of the bird species recorded present. This planting will favour native species, ideally including a diverse range of fruit and nut-bearing species to provide an optimal foraging resource for a wide range of breeding and wintering bird species. Recommended trees include, but are not limited to, English oak, beech, common ash, silver birch, wild cherry, crab apple *Malus sylvestris*, alder *Alnus glutinosa* and rowan *Sorbus aucuparia*. The associated shrub planting will create a native understorey and hence ensure structural diversity as the structural planting matures. Suitable scrub species include but are not limited to: holly *Ilex aquifolium*, hawthorn, honeysuckle *Lonicera periclymenum*, goat willow *Salix caprea*, dog rose *Rosa canina*, blackthorn, guelder-rose *Viburnum opulus* and dogwood. Open glades and rides will be included within the design of the landscape buffer and landscape corridors.
- 6.6.29 A *Farmland Bird Strategy* will be provided to reduce the adverse effect of the proposals on farmland birds – the details are to be confirmed as the ES assessments continue.

Barn Owl

- 6.6.30 Mitigation will be provided for the loss of two probable barn owl nesting/roosting locations from within the Main Site. Two permanent nest sites will be provided, with at least one of these located within 200m of the stone barn (building B5 in Figure 2 of **Appendix 6.3**). A suitable location for the second nest box is towards the north of the Main Site, north of the airfield. Alternatively two barn owl nest boxes will be erected on suitable mature lone trees with few or no low branches⁴⁵ or mounted on poles⁴⁶ close to suitable grassland habitat located away from potential disturbance. These
- 6.6.31 In order to provide continuous availability of nest sites the owl boxes will be provided prior to the commencement of building demolition or renovation works. This will also allow barn owls to have a chance to familiarise themselves with the new nest site. If the location of permanent nest sites are in close proximity to construction activities this could cause potential disturbance and prevent nesting, therefore in such cases a temporary barn owl box will first be erected away from the construction activities in order to provide a continuous availability of nest sites for this species.

⁴⁵ [Online] <https://www.barnowltrust.org.uk/barn-owl-nestbox/owl-boxes-for-trees/>

⁴⁶ [Online] <https://www.barnowltrust.org.uk/barn-owl-nestbox/barn-owl-pole-nest-box/>

- 6.6.32 To minimise the risk of disturbance to barn owls any development work potentially causing disturbance to nest sites (building B5, see **Appendix 6.3**) will where possible avoid commencement between March and August as c.75% of nesting cycles occur within this period³⁷. Given this species breeds all year round however a pre-works survey will be carried out by a licensed barn owl surveyor within 3 days of the works commencing regardless of the time of year. If any active nests, nests being built or dependent young are identified, all works with potential to disturb the nest site will be halted and will not resume until the young are no longer dependent on the adult birds or nest site. This would be a statutory requirement due to the protection of nesting barn owls and their nests against disturbance under Schedule 1 of the Wildlife and Countryside Act (1981 as amended).
- 6.6.33 Nest boxes will also be provided for kestrel and house sparrow. Kestrels require species specific nest boxes at least 5m high on lone trees or buildings close to grassland areas where possible, while house sparrows favour sparrow terraces boxes within the built environment. House martin boxes or swift bricks could be incorporated into the renovated buildings and/or new built environment.

Highway Works

- 6.6.34 A Farmland Bird Strategy will be implemented, the details of which will be confirmed in due course, in order to lessen the magnitude of impacts upon breeding and wintering farmland birds within the Highway Works area through both the construction and operational phases.

Otter

Highway Works

- 6.6.35 Pollution events could potentially impact water quality and sensitive bankside flora and so indirectly impact riverine species including otter, if present. All standard site precautionary and best practice measures will be adopted and secured through the CEMP to ensure that any potential pollution risk is minimised, and should a pollution event occur that procedures are in place and followed to ensure that an appropriate clean-up operation is enforced as soon as possible to minimise the significance and detrimental effect riverine fauna and flora.
- 6.6.36 Appropriate good working practices will be adopted during construction to further reduce the risk of harm to individual otter. Prior to the commencement of works the location of site compounds and contractors access routes will be agreed with the ecologist and positioned to minimise disturbance to otters. Areas to avoid include an 8m width buffer around each of the named tributaries. The following key precautions will also be followed:
- Site operatives will be made aware of the potential presence of otters and the need for a duty of care when working in close proximity to the Gagle Brook;

- Pipes over 250mm in diameter will be capped overnight to prevent otters entering;
- Where deep excavations are left open over-night, shallow, sloping batters, stout ramps and/or covers will be used to prevent animals becoming trapped in the working area; and
- Working operations within the 20m of the above watercourses will be limited to daylight hours.

Invertebrates

- 6.6.37 Calcareous grassland is a high-quality habitat for invertebrates that provides food plants for the larval and/or adult stages of many species.
- 6.6.38 The creation of extensive areas of calcareous grassland within the SSSI and on the created embankments and elsewhere through the site will mitigate for the permanent partial loss of this habitat from the site. Such areas will be subject to low-level management for ecological benefit as delivered through the LEMP resulting in a **Negligible to Minor positive** effect on butterfly species associated with the calcareous grassland and with the Ardley Cutting and Quarry SSSI.
- 6.6.39 Other high and medium quality habitats for invertebrates will be retained and together with created habitats will be managed appropriately for the benefit of this group under the terms of the LEMP.

Residual Effects

- 6.6.40 The assessment of residual effects considers the effects likely remaining after the implementation of the mitigation measures described above in addition to those considered 'embedded' within the development design. The preliminary and outline assessment of likely residual effects to ecological receptors during construction and operation are described below. This is likely to be expanded and revised in the final versions of the ES Chapter, but where possible at this stage, this initial draft assessment draws on experience elsewhere regarding the effectiveness of standard or commonly applied forms of mitigation described in the section above.

Construction

Sites of Nature Conservation Interest

- 6.6.41 *Details will follow once more assessment work and analysis has progressed.*

Fauna

Bats

- 6.6.42 The appropriate timing of works under ecological supervision and the provision of replacement roost habitat under licence from Natural England will ensure that any effect occurring as a result of the loss of roosts is of **Negligible** significance.

Foraging & Commuting Habitat

- 6.6.43 The severance of the Gagle Brook habitat corridor will result in a permanent **Minor (non-significant) adverse** effect of local significance to the bat species that utilise this feature, with the exception of *Pipistrellus* sp. as these species will regularly cross gaps of this scale⁴⁷ (**Negligible** effect).

Birds

Breeding Birds – Main Site

- 6.6.44 Development will lead to the loss of breeding habitat for a range of farmland bird species. The implementation of a Farmland Bird Strategy will reduce residual effects to a **Minor (non-significant) adverse to Negligible** level for farmland specialists including yellowhammer and skylark (County level effect) and other farmland birds including linnet, corn bunting, yellowhammer, skylark and stock dove (local level effect).
- 6.6.45 Combined with retained vegetation, the provision of buffer planting will provide the generalist species mistle thrush and dunnock with suitable breeding and foraging habitat, which over time will reduce the impact on these species to a **Negligible** level.
- 6.6.46 Provision of bird boxes will result in a residual effect on barn owl and house sparrow of **Negligible** significance, however there will likely be a residual **Minor (non-significant) adverse** effect on kestrel at a local level.

Breeding Birds – Highway Works

- 6.6.47 *To be completed following completion of the final survey in May 2022.*

Wintering Birds – Main Site

- 6.6.48 The implementation of a farmland bird strategy will reduce the magnitude of effects on farmland birds overall, however it is considered there will be a residual permanent **Moderate adverse** effect on yellowhammer, and a permanent **Minor (non-significant) adverse** effect on skylark, both at the County level. Likewise a residual **Minor (non-significant) adverse** effect is predicted for grey partridge, stock dove and barn owl at the local level. Suitable mitigation in the form of buffer planting,

⁴⁷ Frey-Ehrenbold A., Bontadina F., Arlettaz R., Orbist M. K. 2013. Landscape connectivity, habitat structure and activity on bat guilds in farmland-dominated matrices. *Journal of applied Ecology* 50: 252,-261.

including provision of alternative winter foraging and roosting sites, will ensure that starling, fieldfare, redwing and lesser black-backed gull are subject to a **Negligible** effect.

- 6.6.49 The local short-term **Minor (non-significant) adverse** effect on song thrush, bullfinch and dunnock will reduce to a **Negligible to Minor positive** effect in the long term as the buffer planting becomes established.

Wintering Birds – Highway Works

- 6.6.50 The implementation of a farmland bird strategy will lessen the magnitude and significance of effects on the breeding and wintering bird assemblages resulting from the development, however some residual effects on the breeding and wintering bird assemblages are still anticipated. Wintering skylark, yellowhammer and corn bunting are predicted to undergo a permanent **Minor to Negligible (non-significant) adverse** effect at the County level, whilst a permanent local **Minor (non-significant) adverse** effect is anticipated for wintering grey partridge, starling and meadow pipit. The effect on the remaining notable wintering bird species (song thrush, redwing, fieldfare, linnet and kestrel) will be **Negligible**.
- 6.6.51 *Further notable flora/fauna details will follow once more assessment work has been undertaken.*

Climate Change

- 6.6.52 It is not considered that overall predicted effects on the Proposed development would significantly alter over the longer-term as a consequence of climate change. This is due to the absence (both pre and post development) of habitats onsite that are most at risk from climate change including montane, coastal, peat bog and other wetland habitats⁴⁸ and their associated species.
- 6.6.53 The proposed habitat creation and enhancement also provides extensive opportunities for species which are currently represented on site (with the exception of some farmland bird species) as well as providing opportunities for additional species to colonise. The creation of extensive, connected and robust habitats for a range of species will help negate some negative impacts of climate change in other areas outside of the development proposals.
- 6.6.54 Gagle Brook and its tributary Ashgrove Brook may be susceptible to changes in flood regime and surface run-off (further assessed in Chapter 9). Any increase in summer drought condition has the potential to lead to a decline in wet grassland communities including rush pastures and water meadows, neither of which were identified within

⁴⁸Biodiversity Climate Change Impacts Report Card 2015 <https://nerc.ukri.org/research/partnerships/ride/lwec/report-cards/biodiversity/>

the baseline habitats, though a wet tolerant grassland mix is proposed to be used around the attenuation basins.

- 6.6.55 Whilst it is recognised that climate change will impact biodiversity including species distributions, migration patterns and life-cycle timing⁴⁹, the effects are complex and interrelated. The LEMP will stipulate that the management of the created / enhanced habitats on site is regularly reviewed and adapted to ensure the establishment of healthy robust habitats. For example, newly planted hedgerows and trees may require more or less watering during establishment than standard guidelines advise. In addition, projected changes in rainfall will need to be taken into consideration during the detailed design of attenuation basins to prevent flooding and also to provide water supplies in drought conditions. In a warmer climate the maintenance of aquatic habitats within the site may become more important for species if natural water sources in the wider landscape become scarcer.
- 6.4.118. The provision and ongoing management of robust connected habitats will provide opportunities for a range of species and allow natural colonisation and changes in distribution to occur. Regular management reviews will be undertaken to ensure resilient habitats and ecosystems on site which will enable species to naturally adapt to climate change. It is therefore not considered that the species or habitats identified on site are particularly susceptible to the effects of climate change or would be substantially impacted by or vulnerable to such changes.

Human Health

- 6.6.56 This section will be completed in draft for the Stage 2 consultation process, but there are unlikely to be significant direct relationships with or impacts on human health.

⁴⁹ Newman and Macdonald 2015. Biodiversity Climate change impacts report card Technical paper 2. *The Implications of climate change for terrestrial UK Mammals* <https://nerc.ukri.org/research/partnerships/rider/lwec/report-cards/biodiversity-source02/>

6.7. CUMULATIVE EFFECTS

- 6.7.1 The cumulative effects assessment will consider the combined effects of the proposed development along with the ‘other development(s)’ on ecological receptors.
- 6.7.2 The potential relevant cumulative schemes will be agreed with the Local Planning Authority.
- 6.7.3 This section will be completed in draft for the Stage 2 consultation process.

6.8. SUMMARY AND CONCLUSIONS

- 6.8 This section will be completed in draft for the Stage 2 consultation process once further surveys are complete and the assessment has been progressed.